Price 2s. 6d.

OHIO STATE UNIVERSITY
NOV 3 1961
LIBRARY

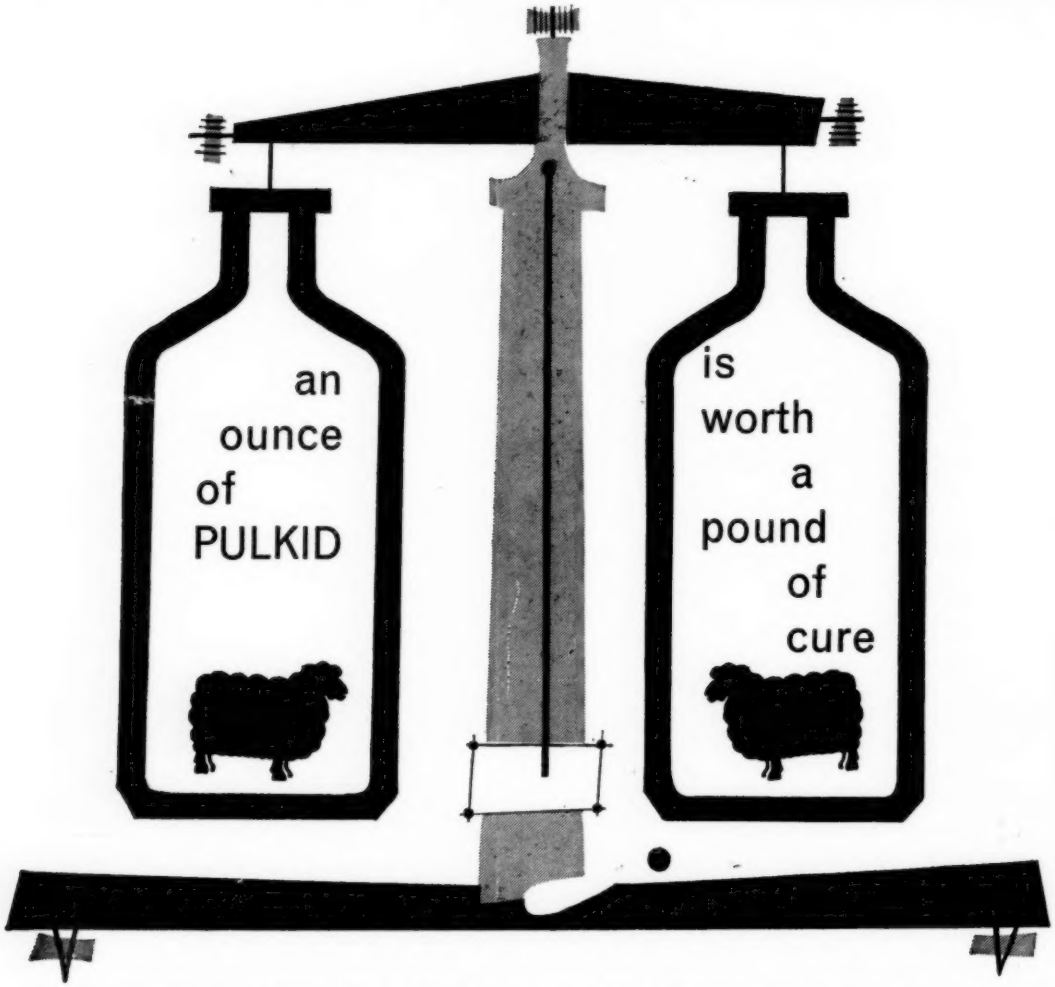
VETERINARY MEDICINE LIBRARY
NOV 7 1961
[redacted]61
NOV 7 1961

The Veterinary Record

PATRON: HER MAJESTY THE QUEEN

Vol. 73 No. 40 Issue No. 4350 957-984

Registered as a Newspaper



Pfizer PULKID vaccines offer protection against sheep disease. Now, before the sheep vaccination season starts, is the time to stock up with:

Pulkid* for preventing pulpy kidney disease

Pulkid* E for preventing pulpy kidney disease and enterotoxaemia

Pulkid* EL for preventing pulpy kidney disease, enterotoxaemia, and lamb dysentery

Pulkid* ELT for preventing pulpy kidney disease, enterotoxaemia, lamb dysentery, and tetanus

And remember, you'll soon be needing Pfizer Blackleg Vaccine and Pfizer Blackleg Antiserum. Stock up now!

Pfizer PFIZER LIMITED · SANDWICH · KENT

*Trade Mark 10133

THE VETERINARY RECORD

Founded by William Hunting, F.R.C.V.S., in 1888

Volume 73
No. 40

SATURDAY, OCTOBER 7th, 1961

7 Mansfield Street,
London, W.1.
Museum 6541

Congress Paper read in Plenary Session

International Collaboration in the Control of Animal Disease

BY

A. W. STABLEFORTH

Director, Veterinary Laboratories and Veterinary Investigation Service, M.A.F.F., Weybridge

WHEN the chairman of the organising committee of the Congress asked me to address this plenary session and suggested "International Collaboration" as a subject, I accepted the title gladly; not only because I hope that what I say about the work of some of the international agencies may interest you, but also because there is in my view no more important task in the world at the present time than to produce more food, especially first-class protein, and no quicker way of doing this than by international collaboration to prevent disease in our domesticated animals and to maintain them in full health and production.

Many other professions are of course concerned in this; we cannot reap the harvest of disease prevention if water or fodder is insufficient to maintain life and production. It is, however, equally frustrating to improve fodder supplies, and potential production of meat, milk, eggs, wool, if the effort is to be crippled by sudden or insidious inroads of disease. In all our efforts to improve living conditions, it is self evident that those concerned with water, with soil, with feeding, with genetic potential, with disease, must work side by side, and also with those concerned with human health. The truly epoch-making advances in human health are making millions more mouths to feed, but they are also making millions more able to work and to produce extra food. They cannot do so if disease prevents their draught animals from working their cultivations or their other animals from producing.

International collaboration has already helped greatly and its potential for further help is enormous. From the nature of animal husbandry and of agriculture, improvement must often be slow and it is sometimes for human or political reasons a great deal slower than it need be. It can, however, transform, and with increasing speed, as peoples realise the value of new methods, new systems, new foods. Sometimes—to be effective—change has to be complete and sudden; often, it can best evolve from a traditional practice or system.

Let us now look at some of the world's needs for food and its impact on us as veterinarians.

It has frequently been stated that at least half of the world's population is either undernourished or malnourished and the present Deputy Director of the Food and Agriculture Organisation of the United Nations (Dr. N. C. Wright) in his address to the British Association at Cardiff last year gave reasons for believing that this is broadly justified: the food supplies of countries representing no less than 60 per cent. of the world's population appear to fall below 2,200 calories per head, of which nearly half are below 2,000 calories, figures which are 600 to 800 calories below that at which it was shown that British adults and children began to lose weight during the 1946-47 food shortage and which are 1,000 to 1,200 calories below our present food consumption. It can be argued that smaller, less energetic peoples, in warm climates, need less food. It is, however, known that undernutrition is an important factor in stature, weight and energy, as well as in mental alertness, and in resistance to tuberculosis and certain other diseases.

The undernutrition is also commonly accompanied by an excess of carbohydrate in the diet and with an insufficiency of protein, in particular animal protein. Milk, meat, eggs and fish form 40 per cent. of the North American diet and 27 per cent. of the British diet; the figure for Europe as a whole is 21 per cent., for Latin America 17 per cent. (higher in some areas, much lower in others), but it is only 11 per cent. for Africa, 9 for the Near East and 5 for the Far East. The lack of variety in the diet and the lack of animal protein is accompanied by deficiencies of vitamins and minerals.

The most widespread and important of diseases caused by protein deficiency is that known as Kwashiorkor. According to the WHO publication "Ten Steps Forward," the disease is now known to occur in many countries under 38 different names from the "sugar baby" of Jamaica to the "enfant rouge" of the Cameroons. Its seriousness led to the setting up of a combined FAO/WHO Committee on Nutrition in 1949 and it has been clearly shown

that a protein-sufficient diet can save a high proportion of even advanced (and in the past doomed) cases and can prevent the disease from occurring. Moreover, it is thought that the prevalence of Kwashiorkor is much greater than so far recognised, and that what is termed pre-Kwashiorkor is even more general in Africa and in many parts of Central and Latin America and in the Far East; in fact in all areas where food supply data indicate a shortage of animal protein.

It is estimated that to feed the world population expected by 1980, *viz.* about 4,000,000,000, at a reasonably improved level, it will be necessary to increase the world's cereal production by 33 per cent. and its production of milk, meat, eggs and fish by 100 per cent., and that to reach a fully adequate level for the 6,000,000,000 U.N. population forecast for the year 2000, animal protein will need to be increased by 300 per cent. It is equally certain that these increases must be in the main achieved in the countries where the shortages exist: firstly because surpluses in other countries are usually very small in relation to total needs, secondly because they would be beyond the means of the needy country to purchase and would be difficult to transport, and thirdly because they are often of a different kind (*e.g.* of grain or meat) which is unacceptable to the people needing them.

Emergency help in time of famine or until deficient countries can increase their own production merits every encouragement but, quoting Dr. Wright again, "such surpluses never should, and never could be relied upon to provide a long-term solution to the world's food supply problems."

The increases needed are very great and they provide a challenge to all concerned with agriculture and in particular with animal production; and to us as veterinarians. It is only necessary to think for a moment of the vast areas of needy countries in which constant attention is required to control indigenous diseases, in which diseases which could be eradicated still claim enormous numbers of victims, in which production is a fraction of what it might be if enzootic and epizootic diseases were vigorously attacked: trypanosomiasis, rinderpest, foot-and-mouth, parasitic diseases, anaerobic diseases; to say nothing of tuberculosis, brucellosis and mastitis.

Improvement of pastures, growing of forage crops, attempts to improve breed types by A.I. or otherwise, lose much in fact, and more in effect, if disease is allowed to nullify or reduce expected increases.

In some areas climatic and soil factors make greater production impossible or very difficult, but there are very large areas of land which can be productive if disease is controlled.

The International Veterinary Congress (and the World Veterinary Association)

The first international meeting on animal disease in Europe and, so far as I can find out, the first anywhere in the world was the International Congress of Veterinary Surgeons held in Hamburg in 1863 at the instigation of John Gamgee, Principal of the New Veterinary College, Edinburgh. Ten nations were represented and there were 103 members.

Rinderpest and pleuropneumonia were the primary subjects of discussion and it was also decided that "the following diseases require police preventive measures, and were therefore especially to be considered in regulations against the spread of epizootics: hydrophobia, anthrax, glanders and farcy, foot-and-mouth disease, scabies, rinderpest or steppe murrain, bovine pleuropneumonia, smallpox in sheep, malignant foot-rot in sheep, malignant disease of stallions." Gamgee himself made a notable contribution regarding pleuropneumonia in Great Britain and its cost.

The 2nd International Congress was held two years later in Vienna, the main subjects of discussion being again rinderpest, in particular the optimum quarantine period, "similar procedure in relation to treatment of animals and animal produce in international commerce," disinfection of railway trucks, rabies and warranty.

Subsequent congresses were held in Zurich in 1867, when rinderpest and contagious bovine pleuropneumonia were again main subjects of discussion but there were included for the first time meat inspection, veterinary education, and state veterinary services; in Brussels (1883) when a "baccalaureate" for entry on a veterinary course and at least 2 years of clinical instruction were recommended; in Paris (1889), Berne (1895), Baden (1899) and in Budapest in 1905 at which it was decided to have a "Permanent Committee of the International Congresses."

Subjects of discussion increased and reflected the widening interests and responsibilities of the profession, and further congresses were held in The Hague (1909), London (1914 and 1930), New York (1934), Zurich (1938), London (1949) and Stockholm (1953). At the latest, in Madrid in 1959, 1,700 ordinary members and over 800 ladies and other associate members from 52 countries attended, and some 12 plenary papers and 340 sectional communications were presented on a very wide variety of subjects.

The next congress will be held at Hanover in 1963 under the aegis of the World Veterinary Association formed at the Madrid Congress; exactly 100 years after the first International Veterinary Congress.

The Establishment of the Office International des Epizooties (O.I.E.)

By the early 1920s the need for a permanent international organisation had become imperative and it is of interest to quote from "L'Histoire de la Médecine Vétérinaire" (1936) by Leclainche, who was Director of the O.I.E. from 1924 to 1949, regarding the background in which this organisation was created.

In 1920, cattle plague appeared unexpectedly in Belgium, following transit, in the port of Antwerp, of Indian zebu cattle destined for Brazil. The reaction was the more lively because the possibility of carriage of the disease thus had not been foreseen. France took the initiative of calling an international

conference to which all countries were invited.

The conference expressed the wish that an international office for the campaign against infectious diseases should be created. An international agreement was signed by 28 "states," and the first meeting of O.I.E. took place in 1927. The number of adherents has now reached 71.

The Office International des Epizooties functions under the authority and control of a committee of the delegates of the contracting governments. It meets once each year and has a permanent Bureau in Paris, of which the Director is chosen by the committee. Its costs are covered by the annual contributions of member governments.

The stated objects of the Office are: (article 4) (1) to promote and co-ordinate experimental and other research work concerning the pathology or prophylaxis of contagious diseases of livestock for which international collaboration is deemed desirable; (2) to collect and bring to the attention of Governments and their sanitary services all facts and documents of general interest concerning the course of epizootics and the means used to control them; (3) to examine international draft agreements regarding animal sanitary measures and to provide signatory governments with the methods of supervising their enforcement.

At the beginning of 1961, OIE's Epizootic Statistics Service was receiving Sanitary Bulletins from 78 countries. Particularly urgent and important information is received and sent out from the Office by telegram but air mail is now generally used for what is called "Urgent Notifications of Epizootics" and for "Information Notes." These have recently been mostly concerned with foot-and-mouth disease, African horse sickness, African swine fever, rinderpest, rabies and swine fever and may at times be sent out to interested parties more than once in a week.

A Monthly Circular on Epizootics is also issued now covering these diseases and also Newcastle disease, bovine contagious pleuropneumonia, sheep pox, blue tongue, haemorrhagic septicaemia, glanders, dourine and brucellosis. It is completed on the 25th of each month and distributed on the first of the subsequent month to 400 veterinary authorities or individuals in different parts of the world, which it reaches between one and at most 12 days later. The value of these services needs no emphasis. Collected statistics will in future be published annually.

The Bulletin of OIE, now issued every 2 months, contains sections for original articles, epizootiology, prophylaxis, documents and information, and development of the zoo-sanitary position: its avowed objective is to provide heads of veterinary services and directors of research institutes with regular accounts of the more important international activities and to direct their attention on occasion to the main urgent epizootiological and immunological problems which have been the subject of recent research and whose study is of particular importance. Subjects dealt with in the 6 issues of the last year have been: The IXth Conference of the OIE Permanent Commission on Foot-and-Mouth Disease; Contagious Bovine Pleuropneumonia and Horse Sickness; Foot-and-Mouth Disease and Tuberculosis; Swine Fever and Sheep Pox; Toxoplasmosis and the January, 1961, Paris Meeting on Horse Sickness; Contagious Ecthyma of Sheep and Antiparasitic Immunity.

The Director in his annual report to the committee also summarises the main facts in the evolution of the various epizootic diseases during the year. His last report deals in turn with local decrease in rinderpest, classical swine fever and sheep pox; progressive disappearance of glanders and fowl cholera; decrease in anthrax and blackquarter; eradication of tuberculosis and brucellosis in many areas; apparent increased importance of enterotoxaemia and of rabies; the extension into new areas of the Asia I, and S.A.T. I, II and III types of foot-and-mouth viruses, of horse sickness into the Middle East with its attendant threat of further spread into Europe, and of African swine fever into Portugal and Spain; with new factors assisting spread and increased importance of disease such as quicker transport, with the rapid development of intensive production of poultry, pigs and calves; with new methods of diagnosis for rinderpest, and African swine fever; with new prophylactic methods; and with changes in regulatory sanitary measures and in current methods of control or eradication with special reference to the methods for foot-and-mouth disease used in different countries of Europe.

A very important part of the activities of OIE takes place at the annual meeting of the committee in May each year at which, in addition to administrative and financial matters, the delegates discuss matters bearing on international sanitary regulations and reports made on selected diseases or aspects of diseases by invited experts.

The Office has Permanent Commissions on Foot-and-Mouth Disease, The Use and Application of Biological Products, Diseases caused by Anaerobes, Echinococcosis-Hydatidosis, Diseases of Bees and, more recently established, The Sanitary Regulations on Importation and Exportation of Animals and Animal Products.

O.I.E. has also organised special conferences from time to time on a number of important subjects, *e.g.* on foot-and-mouth disease approximately every two years since 1946; on bovine trichomoniasis in 1949; on infectious equine anaemia in 1950, 1952 and 1955 and on myxomatosis in 1953, whilst bovine tuberculosis and brucellosis are regular subjects of discussion at the annual meeting of the committee. Finally, there have been established a series of Asian conferences (now run in conjunction with FAO)—the first in Karachi in 1952, the second in Bangkok in 1954.

The Food and Agriculture Organisation—FAO

By far the biggest contribution in recent times to collaborative action to control animal disease has come from FAO, particularly through its ability to provide for experts to go to countries needing them, to provide Fellowships and arrange training centres, and to contribute in other material ways.

FAO came into being in 1945 at Quebec at a meeting at which 54 nations were represented and which was an outcome of the conference called at Hot Springs (Virginia) in 1943 by President Roosevelt. This conference was a result of a memorandum by F. L. McDougall of Australia, putting forward a plan for a "United Nations Organisation for Food and Agriculture" which itself arose out of discussions before the Second World War between Stanley Bruce (later Prime Minister of Australia and Lord Bruce), Boyd Orr (then Director of the Rowett Institute, Aberdeen, now Lord Boyd Orr) and McDougall himself.

Boyd Orr became its first Director General and McDougall one of FAO's Special Advisers. Its headquarters were in Washington until 1950 when they were transferred to Rome. It now has a staff of over 1,000 and has seven technical divisions, *viz.* Animal Health and Production, Fisheries, Forestry and Forest Products, Land and Water Development, Nutrition, Plant Production and Protection, and Rural Institutions and Services. The Animal Health and Production Division has Animal Health, Animal Production and Dairy Branches. The Director and Deputy Director of the Division, and the Chiefs of the Animal Health and Dairy Branches are veterinarians, as are all professional personnel of the Animal Health Branch. The latter has in addition to the Branch Chief, two senior veterinary surgeons (Head of Veterinary Medicine and Tropical Medicine respectively), a parasitologist, one permanent consultant, one veterinarian responsible for the World Livestock Disease Reporting Service and one other who is secretary of the European Foot-and-Mouth Commission which, though separately financed and responsible to its own committee, comes under the aegis of FAO. Veterinarians are also appointed as "experts" for periods of one or two years or may be seconded from their countries. An expert is often re-employed many times on the same or a different assignment.

The work of FAO falls into 2 main parts, the Regular Programme and the Technical Assistance Programme. The former is concerned with headquarters activities and with such matters as conferences, meetings, publications, exchange of information and liaison with other organisations; the latter, financed since 1950 from ETAP or "Point 4 funds," is concerned with most of the field activities of FAO. As regards animal health, it is responsible for the operation of the experts assigned to various projects and countries, and arrangement of Fellowships and training centres.

Funds come from ordinary funds voted every 2 years by members of FAO and subsequently allocated on a country basis, from ETAP funds (through UNESOC) and from the Special Fund (for more extensive projects than are possible under ETAP); whilst additional help is also provided by the André Meyer Fellowships for research.

The headquarters staff of the Animal Health Branch deal with a wide variety of technical and semi-technical enquiries from all over the world, supplying the information from their own knowledge, and experience, or obtaining it from their extensive library facilities, or by way of their wide contacts with specialists elsewhere.

They recruit, brief and service the "experts" on their field assignments in various countries, suggesting directions of development of their programmes, and at the end of each assignment discussing and if necessary editing the final report for presentation to the Government concerned as an official FAO document.

They are responsible for all the arrangements for FAO meetings, conferences, training centres, fellowships, panels; and for immediate and long-term programmes, for progress reports, for liaison with other branches and divisions, wherever veterinary knowledge is needed and, finally, for all publications on veterinary subjects including the Animal Health Yearbook produced in collaboration with OIE, and this year also with WHO.

They also take part in FAO and other meetings and conferences and pay regular visits to their field experts so as to be familiar with the progress and needs of their projects.

Consultants. FAO also employs consultants with special knowledge in particular fields. They may undertake short-term assignments for particular purposes, attend international, regional or panel meetings, prepare publications or attend or organise seminars or training centres on particular diseases.

Panels. FAO has set up panels of experts who meet once or at intervals to assess recent developments and make recommendations regarding diagnosis, prevention, treatment, control or further research. The oldest of these is the panel on infertility which began as a meeting of a few people interested in vibriosis but has widened its scope and met about every two years since, the last time in May this year. Publications have followed on *Bovine Genital Vibriosis* and *Trichomoniasis*. There is also a panel on tick-borne diseases (which has produced a monograph on *The Control of Tick-borne Diseases*), and one on *Bovine Contagious Pleuropneumonia.*

Activities in Member Countries

Requests of a very wide variety are received from member countries; some to help deal with an emergency, some to help set up a regular control programme against a particular disease or group of diseases, some concerned with wider subjects such as meat or milk inspection, veterinary education or veterinary services in general.

Some of the more important subjects, such as rinderpest, foot-and-mouth disease, African horse sickness, with which other agencies have also been concerned will be dealt with later.

Haemorrhagic septicaemia is another disease which has received much attention from FAO, a meeting with demonstrations of new methods of vaccine production having been held in Manila in 1959 (and there is another scheduled for Kuala Lumpur in 1962). Contagious bovine pleuropneumonia was considered at an FAO/OIE/CCTA meeting in Khartoum in 1957 and led to the formation of a panel of experts, a further meeting being held in

Melbourne in 1960. Experts have also been provided to more than one country. Advice in line with modern knowledge regarding anthrax, the anaerobic diseases, tuberculosis, brucellosis, mastitis and other diseases of cattle or sheep is also a regular part of the duties of most assignees.

Notable work has been done to establish or assist control of poultry diseases, to prevent the catastrophic losses which were caused by the acute form of Newcastle disease and to make possible the development of an industry which can contribute a great deal to supplies of animal protein.

Pigs, also, which are a traditional and important source of protein in many countries, have received attention especially as regards programmes for the control of swine fever.

One other source of great loss in nearly all underdeveloped countries, *viz.* parasitism in sheep, has received particular attention in recent years and, as stated earlier, one of the permanent posts in the Animal Health Branch of FAO in Rome is occupied by a parasitologist. Special meetings were also held in Rome jointly with OIE in 1954 on veterinary parasitology and in 1956 on tick-borne diseases.

FAO veterinarians have diagnosed and surveyed, devised and initiated field control programmes for prophylaxis treatment and control, trained local personnel, and the parent body has helped with the necessary equipment or drugs to get effective programmes started.

Sometimes a request is received for help in the establishment of a veterinary service where none exists, or development of an existing service.

Much help has also been given with development or improvement of meat and milk inspection services, with infertility and genital health and in many other fields which are not primarily or entirely veterinary but in which veterinary considerations are important. A combined FAO/WHO expert committee on meat hygiene was held in 1955 (another is to be held this October) and on milk hygiene in 1957, whilst reference has already been made to the infertility panel.

Training Centres are arranged when there is need for the training of a number of personnel in a region in diagnosis or more often vaccine production. These courses last from about 2 weeks to several months and their purpose is to provide practical experience in the laboratory procedures concerned.

One of the earliest was held at Izatnagar in India in 1953 for the production and freeze-drying of rinderpest vaccine, and another was held on the same subject together with vaccines for Newcastle disease at Lahore in Pakistan from October, 1958, to January, 1959.

Others are the training centres on methods for the examination of meat, meat products, milk and milk products, held in Denmark in 1957; that on haemorrhagic septicaemia, anthrax, brucellosis, rinderpest, bovine tuberculosis, sheep pox, anaerobic infections, and certain diseases of poultry held at Cairo in 1955; the haemorrhagic septicaemia training centre at Manila in 1959, and the combined laboratory and field courses run in South America.

A laboratory seminar was also held in conjunction with WHO in Vienna in 1952, the subjects of study including brucellosis, leptospirosis, rabies and tuberculosis.

Courses on infertility and A.I. lasting a full academic year for about 12 veterinarians are also provided by the Swedish Government at the Stockholm Veterinary School every 2 years.

Fellowships are awarded every year to enable veterinarians of member countries to take courses of training or to study or gain experience in other countries. They usually last 6 months to a year but may be for shorter periods for a limited purpose or occasionally for a longer period.

Veterinary Education

An international meeting of outstanding importance attended by representatives of 46 nations and a number of the international organisations was held on Veterinary Education in London in 1960 and led to the setting up by FAO, together with WHO, of an International Panel and to arrangements for a further meeting in 1964.

In the meantime, FAO and WHO are preparing a list of all veterinary schools with their staffs, curricula, etc., and the panel is to study and make recommendations on veterinary education all over the world: presumably numbers, places, curricula, staffing. The needs short-term and long-term are immense and varied, the available personnel short and much help will be needed from the more developed countries both in personnel and in providing training.

The European Foot-and-Mouth Commission

This body was established in 1953 by FAO and held its first meeting in July, 1954, with 6 member nations. It has met yearly since and now has 14 members. It is financed by the member countries and has a whole-time veterinary secretary. The present chairman is Sir John Ritchie. Its aim is regional control in Europe with eradication as the final goal. Member countries have undertaken to control the disease by quarantine and sanitary measures together with a slaughter policy, slaughter and vaccination, total vaccination, or zone vaccination; and if vaccine is used to maintain adequate supplies. A recent resolution has called attention to the danger of entry of an exotic type of virus and the importance of state veterinary staffs having the knowledge and powers to take immediate and radical action.

The Animal Health Year Book

This yearbook was started a few years ago jointly by FAO and OIE. The 1960 edition, just published, lists animal diseases in each of 136 countries and territories with their incidence amongst the various groups of animals and the control measures in operation.

Most of the information comes from replies to a questionnaire sent to member governments, but in the case of the U.S.S.R. and China, according to Dr. Ross Cockrill in the recent press release, it comes from articles in the U.S.S.R. journal *Veterinarya* and certain other sources.

Data are given not only of the animals commonly

domesticated in the western world but also regarding animal groups ranging from the elephant to the rabbit and including camels, buffaloes, alpacas and llamas. There are also sections on birds, fish, bees and on wild fauna.

In addition to the statistical tables the 1960 yearbook includes maps, charts and diagrams, and articles by world-recognised authorities on major changes in the livestock disease position since 1959, on foot-and-mouth disease, on contagious bovine pleuropneumonia, on the zoonoses, on African horse sickness, and on veterinary education, as well as articles on several national institutes. Information on livestock populations and national veterinary services is also included.

United Nations Special Fund Projects

FAO has also recently been asked to take responsibility for a number of new projects under the U.N. Special Fund. One of these, the Near East Animal Health Institute, is expected to come into operation this autumn in Egypt, Irak, Iran, Lebanon, Sudan and, later, probably, Turkey. Its main functions will be to undertake research on special problems of the region; to improve diagnostic methods and act as a reference laboratory; to develop and, in certain cases produce and supply vaccines, sera and standard diagnostic materials; to assist other countries of the region in diagnosis and, when needed, detach specialist personnel to investigate undiagnosed outbreaks of disease, and finally to train counterpart personnel and others from the region and hold Training Centres.

The World Health Organisation—WHO

WHO through its veterinary public health section is also actively concerned with measures to deal with the zoonoses and has expert panels alone or in combination with FAO, and in some cases OIE, which deal with rabies, brucellosis, and other zoonoses (tuberculosis, leptospirosis, salmonella infection, anthrax, echinococcosis) and the hygiene of meat and milk.

Another recent activity of the veterinary public health section is comparative studies on chronic degenerative diseases under which are included cancer, cardio-vascular diseases and a number of muscle, bone, joint and some metabolic diseases.

I will come back to further consideration of some of these activities.

Other international organisations which have concerned themselves with animal health include the Organisation for European Economic Co-operation (OEEC) founded in 1948 and which has held meetings on "The Control of Livestock Diseases in European Countries," on "Diseases of Poultry" and on "Johne's Disease."

The World Veterinary Association has now several specialist international groups affiliated to it: the World Veterinary Poultry Association which held its first Congress in Utrecht last year; the International Association of Veterinary Food Hygienists, and the World Association of Small Animal Specialists. Subjects of fundamental importance in control of animal diseases are also a part of many other international meetings, *e.g.* the International Congress on Animal Reproduction last held at The Hague this year, and the International Association of Microbiological Societies (IAMS) with its four-yearly congresses (the next to be held in Montreal next year) and its section on biological standardisation (which held its 7th Congress in London last week).

The Commonwealth Bureau of Animal Health also provides a world-wide service and one which is unique with its wide territorial and language cover and its publications: the *Veterinary Bulletin*, *Index Veterinarius* and *Veterinary Reviews and Annotations* (in future to be incorporated in the *Veterinary Bulletin* so as to make its specialist articles more easily available).

Regional Associations must also be mentioned, because they have assisted very greatly in the control of animal disease and many foredated the big international organisations. Some of these are the various African veterinary congresses which have been concerned with bacterial, viral and protozoal diseases and their carriers, the Interafrican Bureau of Animal Health (IBAH) set up by the Commission for Technical Co-operation South of the Sahara (CCTA) and formerly known as the Interafrican Bureau of Epizootic Diseases (IBED), the Pan American Congresses of Veterinary Medicine, the Australian Congresses, the Nordic Veterinary Congresses, the Balkan Conferences, the North American meetings and those of the Central Treaty Organisation (CENTO) sub-committee on animal health and production with their practical seminars and assistance with training. There are many others.

Programmes for the Control of Specific Diseases

Rinderpest

Rinderpest has caused more widespread and catastrophic losses than any other animal disease. It also exemplifies well the gains from international and regional collaboration.

It was, as we have seen, responsible more than anything else for the calling of the first international veterinary congress, for the founding of the Office International des Epizooties (OIE) and it also was one of the first diseases to be tackled by FAO following a meeting on animal health held in 1946 in London. In the next two years FAO veterinarians, at first with money transferred from UNRRA, helped with control of the disease in China, Thailand, Ethiopia, and Afghanistan, developing and producing rabbit-adapted and egg-adapted vaccine in China and goat-adapted vaccine in Ethiopia and Afghanistan and assisting the formulation of plans for control throughout south-east Asia. FAO also played a major part in the development of the production of freeze-dried vaccine, and of safety potency tests, providing the necessary equipment, engaging experts and training local personnel. An international meeting was also held in Nairobi in 1948.

Meanwhile, national and metropolitan powers had been active in many places, and OIE arranged that rinderpest control should be a major subject of discussion at its first Asian conference in India at Karachi in 1952, as it also was at the second Asian conference in 1954 in Bangkok, at the third Asian

conference on epizootics called jointly by OIE/FAO in 1956 at Tokyo this time with Colombo Plan and ICA participation, at the fourth FAO/OIE Far East meeting on animal health at Manila in 1959, and as it will be at the fifth meeting which is scheduled for Bangkok again in December this year.

Already in 1954 India had launched its pilot 5-year plan of control in the states of Mysore, Madras, parts of Bombay, Hyderabad and Andhra, and has followed this with a second 5-year plan extending the scheme to all states. The size of the operation can be realised by the fact that at December, 1960, 89,451,000 animals had been vaccinated or 70 per cent. of the total cattle and buffaloes. It has been very successful, the disease having been eradicated from a large part of southern India.

Regional plans for rinderpest control in south-east Asia were also considered at Phnom Penh in Cambodia in 1956 and for the Pakistan and Indian border areas at New Delhi in 1957.

Control and eradication had been steadily progressing in most of Africa and in 1957 IBAH produced an Interafrican Convention for the prevention of the disease and organised campaigns in threatened areas, a meeting having also been held last May in Northern Nigeria.

Reference has already been made to the training centres at Izatnagar in 1953 and at Lahore in 1958.

The importance of the great reduction of rinderpest and its eradication from large areas can best be emphasised by reference to the enormous losses it caused previously in Europe (more than half a million in the 1865 outbreak in Great Britain, nearly a million in 1884 in Russia), and to the more recent losses in China where the loss each year was stated to be over a million animals, and in India where despite much vaccination it was said to be 200,000 a year.

Foot-and-Mouth Disease

Foot-and-mouth is another disease which necessitates regional or combined action for its control and eradication. It is, as you know, one of the most difficult diseases to control because of its extreme contagiousness and the variety of types which may be concerned; and it is one of the greatest causes of loss because of its interference with milk, meat and wool production and with working capacity —which may be catastrophic where cultivation and transport depend on buffaloes or oxen.

The direct annual financial loss from the 1951-52 outbreak in Europe was estimated by FAO to be of the order of $400,000,000 (nearly £150,000,000). The possible spread of exotic types into areas where they had not earlier existed also constitutes a particularly serious menace which highlights the danger of too much dependence on vaccination policies.

Reference has already been made to the European Commission for the Control of Foot-and-Mouth Disease set up in 1954, which is playing an increasingly greater part in control in Europe, through its Standing Technical Committee and its strong panel of research workers who review recent research and advise the Commission on methods of diagnosis, typing and vaccine production. In this connexion the Virus Research Institute at Pirbright has been designated by FAO, and also by OIE, as the World Reference Laboratory for typing and strain differentiation.

Between 1955 and 1959, FAO also assisted with the setting up of vaccine production establishments in Yugoslavia, Austria, Greece, Turkey, Thailand, Indonesia and Iran. They also gave assistance in Central America, and in 1956 a meeting in Paris convened by FAO made recommendations on quarantine regulations and other measures to prevent the spread of foot-and-mouth by export and import of cattle, fresh meat and meat products.

In 1957 the European Commission provided vaccine for emergency use in Austria and in Turkey, this being supplied at reduced cost by the Netherlands government.

Meanwhile, in 1957, the Interafrican Bureau of Animal Health (IBAH) had put forward an Interafrican Sanitary Convention for the control of foot-and-mouth and regional meetings on control in Latin America were arranged by the Pan American Foot-and-Mouth Disease Centre in Rio de Janeiro; another is shortly to be held in the Pampas region. Foot-and-mouth was also a main subject of discussion at the combined FAO/OIE meetings in Tokyo in 1956, and at Manila in 1959 as well as the annual meeting of OIE in May, 1960 (where, in particular, recommendations were made for action if exotic types should be brought to Europe), and the meetings of OIE with the European Foot-and-Mouth Commission in Brussels in 1960 and again this year.

Great progress has also been made in recent years in the development of tissue culture or other attenuated vacines which are likely to be considerably cheaper than present vaccines and FAO has been giving assistance in important field trials in Africa and the Far East. She is also doing her part to maintain vigilance against the spread of exotic types such as the Asian I or South African types I, II, and III into other countries: as in fact happened a few years ago in Israel.

Both OIE and FAO also help to maintain liaison between national and international laboratories such as the Foot-and-mouth Laboratory in Amsterdam, Rio de Janeiro, Plum Island (U.S.A.) and Pirbright.

African Horse Sickness

The outbreak of African horse sickness which occurred last year in the Middle East provides a striking example of emergency international action. This disease, which was originally limited to Africa and especially to South Africa, had gradually extended north and had in fact caused serious losses in the Near East in 1943-44. In the spring of 1960 the disease broke out in West Pakistan, Afghanistan and Iran and within a few weeks Iraq, India, Syria, Saudi-Arabia, Turkey, and later Cyprus, also became infected. In many of these areas spread was assisted by the customary nomadism of the peoples concerned and by the presence of large numbers of insect vectors. Losses were enormous, *e.g.* in Southern Iran about half of the total horses were affected and 90 per cent. of these died.

FAO supported the activities of the affected

countries with diagnosis, provision of experts for the production and freeze-drying of vaccines, with equipment and with mice for vaccine production units. CENTO also helped with equipment and mice.

Meetings were urgently convened jointly by FAO and OIE in Beirut in 1960 and in Paris in January, 1961, to concert recommendations for action. Outbreaks have this year so far been less widespread or severe, and none has occurred in several countries.

African Swine Fever

At the latter meeting the appearance of African swine fever in the Iberian peninsula was also an important subject of discussion. This is a disease which could literally wipe out the pig industry if it were not detected and dealt with at once; it exemplifies again the danger which accompanies the speed of modern transport and the need for effective international vigilance and communication of disease data.

The Zoonoses

FAO and WHO have collaborated closely in the study of the zoonoses (*i.e.* diseases of animals communicable to man). Certain of these diseases, brucellosis and tuberculosis were included in an FAO meeting in Warsaw in 1948 and a WHO/FAO panel was subsequently formed and met in Geneva in 1950 and in Stockholm in 1958, a list of zoonoses being drawn up and special attention given to bovine tuberculosis, anthrax, glanders, Q fever, salmonella infection, psittacosis, encephalomyelitis, and parasitic infections such as hydatidosis, taeniasis, trichinosis, fascioliasis, and arthropod transmitted diseases.

Laboratory seminars were also held in Vienna (as already mentioned) in 1952 and in Warsaw in 1957. In 1958 FAO assigned an expert in the zoonoses to Latin America to assist and advise governments and to work in close collaboration with the Pan American Zoonoses Centre in the Argentine.

Brucellosis

An expert panel on brucellosis has been established jointly by WHO and FAO and has held meetings in 1950 in Washington, 1952 in Florence, and 1957 in Lima. All aspects of the disease in man and animals have been subjects of discussion and recommendations: bacteriology, pathogenesis, epidemiology, diagnosis, vaccination, treatment and eradication.

A number of FAO/WHO special brucellosis centres have been established with regional or special responsibilities, *e.g.* at Weybridge we maintain for issue the FAO/WHO reference type strains and the International Standard anti-Brucella Serum, and are specially responsible for typing, diagnosis and vaccine matters.

A laboratory training centre was also arranged jointly by CCTA, WHO and FAO at Elisabethville in the Belgian Congo in 1958. Extensive experiments have also been supported by FAO and WHO at the Pasteur Institute in Tunis, in Spain and in Malta, contributions having also been made by the university of California and ourselves.

Rabies

This was the subject of meetings of an expert WHO panel in 1950 in Geneva, 1953 in Rome, 1957 in Paris and 1959 again in Geneva as well as of the Vienna seminar already referred to. Discussions were held and recommendations made on diagnosis, vaccination and serum treatment, the value of the latter being clearly brought out by a comparative trial in Iran reported at the Paris meeting. A training centre was also held at Konoor in 1952.

The Standardisation of Biological Products

WHO has also an expert committee on biological standardisation to which FAO sends a representative. It meets yearly and has performed an outstanding service to international collaboration. Over 100 standards have now been established and they include antigens, antitoxins and antisera, blood typing sera, antibiotics, hormones, vitamins and enzymes. Their purpose is "to provide a means of ensuring uniformity throughout the world in the designation of potency of preparations used in the prophylaxis, therapy or diagnosis of human and animal disease, and which cannot be characterised adequately by chemical and physical means" (12th Report of the Committee, 1958). They do this by providing a standard against which other preparations can be comparatively assayed in the local conditions and animals existing at any given place.

Standards of veterinary interest, many set up recently and specifically for veterinary use, include those for tetanus antitoxin and toxoid, those for various other clostridial antitoxins (*Cl. welchii* B and D, *septique*, *oedematiens*), for staphylococcus α toxin, for tuberculin (mammalian and avian), for anti-*Br. abortus* serum, anti-rabies serum, anti-Q fever serum, swine erysipelas serum and killed vaccine and for leptospira reference sera, as well as those for most of the antibiotics and many of the hormones, vitamins and enzymes. Others now under consideration or trial are standards for Newcastle disease killed vaccine, anthrax spore vaccine, swine fever serum, *Cl. oedematiens* toxoid and sheep pox vaccine.

I have talked to you of the increasing needs of the human population of vast areas for animal protein; of the needs of underdeveloped countries also to produce surpluses of primary agricultural products with which to balance their economy (or import other needs); of the enormous losses of life and of production (of meat, milk, eggs, animal fibres, draught) which disease is known to cause; of the measures which can be used to prevent or reduce or eradicate disease; of the great needs of many countries for trained veterinarians and assistant technicians, and in due course to have their own colleges and schools; and finally of the great pioneer work already being done by national, regional and international effort.

What is needed in the future, more than anything else, is that national efforts (and all else depends basically on national efforts) should be co-ordinated and welded into regional and international action, so that what has been demonstrated so clearly in

(*Concluded at foot of col.* 1 *opposite*)

Novobiocin in the Treatment of Staphylococcal Mastitis in Cows

BY

JOHN MAFFEY
Veterinary Investigation Centre, Langford House, Langford, Bristol

AND

OLGA UVAROV
Glaxo Laboratories Ltd., Greenford, Middlesex

SUMMARY.—A comparative trial of two antibiotic preparations for their effect in achieving bacteriological and clinical cures of staphylococcal mastitis is described. Clinical cures followed in 23 *out of* 24 *quarters* (96 *per cent.*) *treated with novobiocin and* 19 *out of* 25 *quarters* (76 *per cent.*) *treated with a combination of penicillin with streptomycin.*

THE use of pencillin against bovine mastitis has been considered the greatest advance in its treatment. Its value in this treatment is now well established—see for example Stableforth (1948), Gould (1948), Hughes, Christie and Farmer (1950), Davidson (1956), Wilson (1954), Wilson (1959), and much has been reported on its uses. Its persistence in the udder after intramammary injection has also been studied (Watts, 1948; Zweig, 1949; Hignett, 1950; Edwards & Haskins, 1953; Uvarov & Muggleton, 1954; Uvarov, 1960).

Although the incidence of mastitis due to *Streptococcus agalactiae* has declined in the last few years, cases of this disease due to other organisms, particularly staphylococci, have increased (Davidson, 1956). Moreover the number of penicillin-resistant strains of staphylococci is also increasing (Wilson, 1958). In practice several drugs are used for treatment of staphylococcal mastitis, with varying results. They include penicillin, and combination of penicillin and streptomycin, the broad spectrum antibiotics, the sulphonamides and, at times, various combinations of such drugs. It is difficult to assess the relative value of so many different preparations under field conditions. Good clinical results are still being obtained with penicillin. Combination of penicillin and dihydrostreptomycin is also satisfactory (Bratlie & Fodstad, 1956). There have been no reports of *Str. agalactiae* strains being resistant to penicillin although many hundreds such strains have been examined (Stableforth, 1959). Broad spectrum antibiotics are sometimes used to treat mastitis, but their routine use is not recommended unless they are specifically indicated (Stableforth, 1959).

It is becoming apparent that staphylococcal mastitis sometimes does not respond to the currently employed intramammary preparations. With this in mind we have investigated a new antibiotic, novobiocin,* and compared its efficiency with that of a combination of penicillin and dihydrostreptomycin† for treating staphylococcal mastitis.

Novobiocin is derived from *Streptomyces spheroides* and is used as its monosodium salt. The antibacterial spectrum of novobiocin resembles that of penicillin in that it is active against some Gram-positive and some Gram-negative organisms. Its most important activity is against many strains of staphylococci. In mastitis this is of particular value when the organism has been found resistant to penicillin. Finland (1957) reported that the minimum inhibiting concentration of novobiocin for staphylococcus was in the range of 0.02 to 50 μg. per ml. We have examined 21 strains of *Staph. aureus* (some penicillin resistant and some penicillin-sensitive) isolated from clinical cases of mastitis. They were all sensitive in the range of 0.156 to 0.625 μg. per ml.

Novobiocin is bactericidal in action. It does not produce cross-resistance to other established antibiotics.

Novobiocin in the Udder

Novobiocin was tested for irritation in the udder of three apparently normal cows. Milk samples were obtained 2 days before injecting this antibiotic and 3 days after. The cell content was normal in 11 quarters before introduction of novobiocin. In all 11 quarters there was no change as a result of infusing

* Biotexin Veterinary Cerate, Glaxo.
† Streptopen Veterinary Cerate, Glaxo.

International Collaboration in the Control of Animal Disease.—*Concluded.*

rinderpest control in several regions of the world, and in foot-and-mouth control in Europe may become increasingly the policy of every nation, and so that each may gain from the experience of others in controlling the more insidious diseases.

Just in such measure as this necessity is recognised and implemented, just so soon will the losses from animal disease be reduced or finally abolished, and the needs of the human populations of so many countries for increased animal protein be correspondingly satisfied.

Acknowledgment.—Grateful acknowledgment is made to the many who have helped in the preparation of this paper by provision of data, personally or in published form: in particular, Sir Thomas Dalling, Dr. K. V. L. Kesteven and Dr. W. Ross Cockrill, all of the FAO, Dr. M. M. Kaplan of the WHO, Dr. R. Vittoz of the OIE, Mr. M. Crawford of the Commonwealth Bureau of Animal Health, and Mr. D. E. Gray, Librarian to the Central Veterinary Laboratories (Weybridge).

novobiocin. One quarter had a subclinical mastitis before injecting novobiocin, and the cell content fell as a result. Whiteside tests were also carried out, and there was no reaction to this test after the treatment.

Excretion of Novobiocin After Intramammary Use

Antibiotic assays of milk samples were carried out after infusion, and indicated that novobiocin is excreted fairly rapidly (Fig. 1). To achieve the result required, it should be infused into the affected quarter once daily.

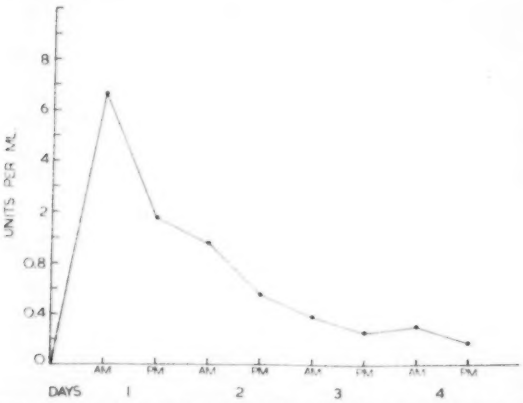


FIG. 1.—Novobiocin levels in the milk of cows after intramammary infusion of 250,000 units (as monosodium salt).

Materials and Method

In this trial the antibiotic was used in an oily suspension with 3 per cent. aluminium stearate, a single dose containing 0.25 gramme novobiocin. One tube was infused into the affected quarter once daily for 3 days. Bacteriological examinations of milk samples before and at approximately weekly intervals after treatment were carried out. Tests on the sensitivity of the organisms to penicillin and streptomycin were also carried out.

The herd selected for the trial consisted of 50 Friesian cows in which clinical mastitis had been a problem over the previous 2 years. Quarters were chosen for treatment that showed clinical mastitis characterised by a drop in milk secretion, with or without obvious udder reaction at the time. From all these quarters haemolytic staphylococci were recovered before treatment. Penicillin and streptomycin preparations had been used for treatment before the trial. It was therefore decided to compare the effect of novobiocin with that of a combined penicillin and streptomycin preparation.* Alternate cases were treated for 3 days with the 2 preparations. The excretion of antibiotic after use of the combination of penicillin and streptomycin is shown in Fig. 2.

Sensitivity of Staphylococci

Forty-nine quarters yielded staphylococci, those from 47 were examined for sensitivity to penicillin

* Streptopen Veterinary Cerate, Glaxo.

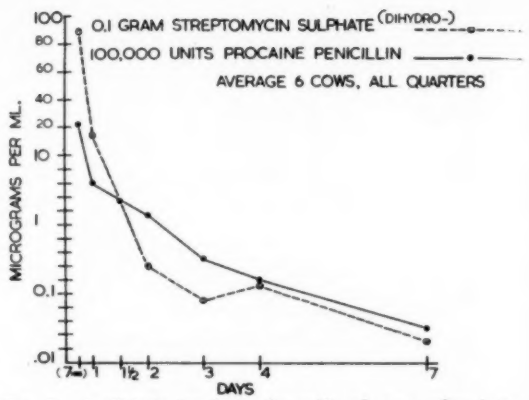


FIG. 2.—Antibiotic levels in the milk of cows after intramammary infusion of streptopen veterinary cerate.

and streptomycin. Of these only 4 were sensitive to penicillin, but 45 were sensitive to streptomycin.

Most of the clinical quarters treated thus were infected by penicillin-resistant staphylococci as tested by the Sentest disk method at concentrations of 0.5 and 2.5 units per ml. of penicillin. On the other hand all staphylococci except 2 were sensitive to 80 μg. of streptomycin.

Effect of Treatment

(a) *Bacteriological Cure*

Of the 49 affected quarters, 24 were treated with the novobiocin preparation and 25 with the penicillin and streptomycin preparation. After treatment staphylococci could not be recovered from 21 (87 per cent.) of those treated with novobiocin, or from 19 (76 per cent.) of those treated with penicillin and streptomycin when sampled approximately 6 days after the end of treatment.

The staphylococcus isolated from 1 quarter on sampling after treatment was due to reinfection, since it was sensitive to penicillin, whereas the primary infecting staphylococcus had been found resistant. Evidence of rapid reinfection of quarters was seen by post-treatment isolation of staphylococci from 5 quarters; pre-treatment sampling had failed to disclose this organism.

(b) *Clinical Cure*

Clinical cure of a quarter was assessed to have taken place if the quarter remained normal for an arbitrary period of 30 days after treatment.

The summary of results is shown in Table I.

TABLE I

Number of quarters from which staphylococci were isolated	Number of quarters treated		Number of quarters showing clinical cure	
	Novobiocin	Penicillin and Streptomycin	Novobiocin	Penicillin and Streptomycin
49	24	25	23	19
	Percentage clinical cure		96%	76%

Discussion

For treating clinical mastitis in individual cows the choice of antibiotic presents a constant problem owing to the variety of mastitis pathogens and the differences in their sensitivities to different antibiotics. The problem is further complicated by the necessity for prompt treatment, that is, treatment before a build-up of inflammatory tissue takes place in the affected quarter to "wall off" the antibiotic from the invading organism (Ullberg *et al.*, 1958). The assistance gained by typing the infecting organism is off-set by the time taken for this to be established.

At present, therefore, it appears rational to select an antibiotic or combination of antibiotics effective against the main mastitis pathogens. *Str. agalactiae*, *Str. dysgalactiae*, and *Str. uberis* are consistently sensitive to penicillin, as they do not produce penicillinase, but in recent years the number of strains of *Staph. pyogenes*, the commonest single penicillin-resistant pathogen, has increased. Wilson (1958) reported that in 1955-56, 40.6 per cent. of strains were resistant to penicillin but in 1958 this had risen to 68 per cent.

In our trial a combination of penicillin and streptomycin, which was used as the control treatment, cured clinically 76 per cent. of quarters infected with mainly penicillin-resistant staphylococci. But this percentage, although good, was raised by the test antibiotic, novobiocin, which affected a clinical cure in 96 per cent. of mastitis cases due to penicillin-resistant staphylococci, one of which was also resistant to streptomycin.

Novobiocin would, therefore, appear from this preliminary trial to be of high value in combating staphylococcal mastitis. Although in 6 mixed infections with *Str. dysgalactiae*, the latter organism was eliminated by novobiocin, in view of its spectrum it is advisable to test it further against streptococcal infections. If necessary it could be combined with other antibiotics, as it has not been found to antagonise their action *in vitro*.

References

BRATLIE, O., & FODSTAD, F. H. (1956). *Dairy Science Abstracts*. **18**. 6.

DAVIDSON, I. (1956). *The Agric. Review*. July.

EDWARDS, S. J., & HASKINS, M. D. (1953). *J. comp. Path.* **63**. 53.

FINLAND, M. (1957). *The Practitioner*. **179**. 84.

GOULD, G. N. (1948). *J. Farmers Club*. Pt. 4. 42.

HIGNETT, S. L. (1950). *Vet. Rec.* **62**. 11.

HUGHES, D. L., CHRISTIE, G. J., & FARMER, R. K. (1950). *Vet. Rec.* **62**. 11.

STABLEFORTH, A. W. (1948). *J. Farmers Club*. Pt. 4. 42.

———, & GALLOWAY, I. A. (1959). "Infectious Diseases of Animals." Vol. 2. 624. Butterworths Scientific Publications, London.

ULLBERG, S., HENSSON, E., & FUNKE, H. (1958). *Amer. J. Vet. Res.* **19**. 84.

UVAROV, O., & MUGGLETON, P. W. (1954). *Vet. Rec.* **66**. 200.

———. (1960). *Ibid.* **72**. 52.

WATTS, P. S., & MCLEOD, D. H. (1948). *J. comp. Path.* **58**. 232.

WILSON, C. D. (1954). *Vet. Rec.* **66**. 775.

———. (1958). *Brit. med. J.* i. 1,415.

———. (1959). "Vet. Ann." 58. John Wright and Son Ltd., Bristol.

ZWEIG, J. (1949). *Vet. Rec.* **61**. 811.

Divisional News

THE SOCIETY OF WOMEN VETERINARY SURGEONS

The 19th Annual General Meeting was held at the Field Station of the Royal Veterinary College on May 25th, 1961, at 2 p.m. Miss Tillemont-Thomason presided. Twenty-four members and two visitors were present.

Apologies and good wishes were received from Miss Wood, Miss Dalby, Miss Briggs, Miss Brancker, Miss Humphries, Miss McLelland, Mrs. Lockhart, Miss Maloney, Miss Milnes, Mrs. Seymour Smith, Miss Wilson and Mrs. Clarke.

Professor Burrow welcomed members to the Field Station and explained the programme of the visit.

It was reported that the President and Secretary had attended a dinner at the House of Commons organised by the British Federation of Business and Professional Women, and that the Society had been invited to join the Federation. The Federation had the amount of their annual subscriptions under review, and it was decided to await the result of this before making any decision.

The Treasurer, Miss M. Egginton, reported the satisfactory state of the Society's finances. Copies of the balance sheet were distributed.

The President reminded members that the Officers remained unchanged in the present year, since they had been elected for 2 years. Two new members of the Council and one Representative on the B.V.A. were, however, required. The Council nominated Mrs. Baumann and Mrs. Kelly for the vacancies on the B.V.A. Council and they were unanimously elected.

The President then reported that the B.V.A. had decided to reduce the size of its Council and from next year the Society would be represented by 2 members. The Council nominated Mrs. Cole Powney who, having agreed to serve for one year, was unanimously elected.

Fleming Memorial Fund

It was proposed by Mrs. Baumann and seconded by Miss Uvarov that a donation should be given to the Fleming Memorial Fund. The members present felt that the Society would wish to acknowledge its gratitude to the discoverer of penicillin in a suitable manner, and it was agreed that a donation of £10 10s. should be given.

Mr Dave Douglas

Mrs. Kelly brought to the notice of the meeting the recent death of Mr. Dave Douglas. He had been most helpful at the meetings of the Society and his widow was left in difficult circumstances. It was proposed by Mrs. Erica Thompson and seconded by Miss Uvarov and agreed that a donation of £2 2s. should be sent to the Fund at Liverpool.

Mr. A. B. MacIntyre

Miss Joshua spoke of the recent death of Mr. A. B. MacIntyre of the Wellcome Foundation. He had been of unfailing help to members in canine virus matters and a memorial fund had been started by V.V.B.F. It was felt that those who knew him would like to contribute and it was agreed that a collection should be made from among those present.

The Results of An Artificial Insemination Experiment Within a Single Pig Breeding Herd

BY

PETER RADFORD

Department of Animal Husbandry, University of Bristol

SUMMARY.—The desirability of conducting artificial insemination experiments under controlled husbandry and feeding conditions is emphasised.

The method of detecting oestrus and insemination techniques are described.

Semen from Large White boars gave a significantly higher farrowing rate than did semen from Landrace boars.

The breed of sow had no effect on farrowing rate.

No correlation was shown between sperm dose and farrowing rate, where the dose was in the range of 3 to 30 x 10^9 sperms.

The number of litters previously produced by the sow appeared to be correlated with farrowing rate. The culling rate was seen to be high.

Semen loss at insemination had no effect on farrowing rate.

"Deep cervical" catheter penetration gave a significantly higher farrowing rate than did "intrauterine" penetration.

Insemination on the 4th, 5th and 6th days after weaning gave a significantly higher farrowing rate than insemination on other days.

AFTER the report by Rodin and Lipatov (1935) of artificial insemination in the pig, little was heard of the use of the technique until interest was restimulated by Japanese workers in the late 1940's. Since then many reports of both field and laboratory experiments have been published from many parts of the world. Farrowing results from first insemination at artificial breeding centres are generally between 20 and 50 per cent. Reports on the results of field services include those given by Ito, Niwa, Kudo and Mizuho (1948), Laurans and Mauleon (1952), Coronel (1954), Du Mesnil du Buisson and Dauzier (1956), Polge and Rowson (1956), Aamdal and Hogset (1957), Dauzier and Du Mesnil du Buisson (1958), Kvasnickii and Konjuhova (1958), Aamdal (1959), Gotink (1959), Holt (1959), Jakobsen (1959), Madden (1959), Niwa, Ito, Kudo, Mizuho and Soejima (1959), Radford (1959) and Willems (1959).

On the other hand results from laboratory trials have been higher and have ranged from 50 to over 80 per cent. of sows and gilts pregnant to first inseminations. Unfortunately in many laboratory experiments animals have not been allowed to farrow, and results have been based on recovery of fertilised ova. Results of experiments under laboratory conditions have been reported by Wiggins, Grummer and Casida (1951), Polge (1956), Niwa (1958), Dziuk and Henshaw (1958), Hancock (1959), Hess, Ludwick and Teague (1959), Gusev (1959), Foote, Young, Turkheimer and Bratton (1959), and Thibault (1959).

Several of these authors have suggested the optimum number of sperms to inseminate, and generally recommendations fall within the range of 2 to 10 x 10^9 sperms. Little information is, however, available on the comparative fertility of various breeds of boars and sows. Literature relevant to the optimum time for service in relation to oestrus has been amply reviewed by Burger (1952) who, as a result of his own and other workers' results, stated that service should be performed as soon as possible after the sow first accepted the boar.

The effect of depth of catheter penetration on conception rate has been reported on only by Hancock (1959) and Melrose (1960). The interval between weaning and onset of oestrus has been reported on by Struve (1911), Marshall and Hammond (1937), Kronacher (1927), Krallinger and Schott (1937), Asdell (1938), and Burger (1952). Generally it was claimed that the interval varied between 3 and 16 days. Self and Grummer (1958) and Radford (1959) showed that as length of lactation decreased so the weaning-oestrus interval lengthened. Madden (1959) as a result of field trials claimed that insemination on the fifth day after weaning was probably most likely to give the highest farrowing result.

The impossibility of controlling field conditions presents a major difficulty in planning artificial insemination experiments. Hence it was considered desirable to carry out a series of inseminations under uniform feeding and husbandry conditions and as far as possible at the same stage of oestrus. Through the courtesy and co-operation of Cow & Gate Farms Ltd. it was possible to conduct an experiment to investigate the effects of various factors other than stage of oestrus at insemination, on the farrowing rate of artificially inseminated sows. The herd in which the experiments were conducted comprised some 400 breeding sows. Since all the boars involved were used both to provide semen for the artificial insemination experiment and to perform natural mating, a direct comparison was possible between the farrowing rates of artificially inseminated and naturally mated sows.

Materials and Method

(a) *Treatment of Sows.*

All sows in both the control naturally mated group, and the experimental artificially inseminated group were weaned after suckling their litters for approximately 56 days. From the day of weaning all sows

were tested for oestrus once daily with a boar which was allowed to remain with the sows, under careful supervision, for about 5 minutes. Mounting of sows by the boar was not allowed. The sows in the experimental group were drafted into a passageway in front of the boar pens and were inseminated within 4 hours of teasing. The sows in the control group were mated within 4 hours of teasing. Each boar was allowed only one service daily and no more than 2 services each week.

(b) *Artificial Insemination Techniques.*

Six Large White and four Landrace boars were trained to mount a dummy sow and ejaculate into the artificial vagina designed by Aamdal, Hogset, Sveberg and Koppang (1958).

Sows were either pure-bred Landrace or various crosses of the Landrace, Large White and Wessex Saddleback breeds. They ranged in age from 1 to 8 years and had previously produced from 1 to 14 litters. All sows were inseminated with 100 ml. of diluted semen through the cuffed plastic catheter described by Aamdal and Hogset (1957). According to the volume of gel-free ejaculate and the number of sows to be inseminated semen was diluted with the diluent described by Stower and Bud-Husaim (1957) in a semen-diluent ratio of between 1: 1 and 1: 3. The number of sperms inseminated ranged from 3 to 30 x 10^9. The sperm density of gel-free semen was determined nephelometrically by the method described by Radford and Herdan (1961).

One worker carried out all inseminations, which were performed within 2 hours of the semen having been collected. At insemination it was noted whether semen flowed back from the vulva and the depth to which the catheter penetrated. In Part I of the analysis of results, only sows which lost no semen and in which catheter penetration was "deep cervical" were included. The effects of loss of semen and "intrauterine" penetration of the catheter were examined in Part II of the analysis of results.

Results

(a) *Part I.*

The fertility of 6 Large White and 4 Landrace boars used for both artificial insemination and natural service is shown in Table I. Of 133 sows artificially inseminated with semen from Large White boars and 34 sows inseminated with semen from Landrace boars, 116 or 87 per cent., and 21 or 62 per cent. respectively farrowed. The difference was significant in favour of the Large White boars at $P<0.01$ (Chi-squared = 10.48 with 1 d.f.).* On the other hand, of 83 sows mated to Large White boars, and of 58 sows mated to Landrace boars, 62 or 75 per cent., and 45 or 77 per cent. respectively farrowed. The difference between the farrowing rates was not significant (Chi-squared = 0.16 with 1 d.f.). On the other hand the difference between the farrowing rates of sows artificially inseminated with semen from Large White boars and naturally mated to Large White boars was significant at $P<0.05$ (Chi-squared = 5.53 with 1 d.f.). There was, however, no significant difference between the farrowing rates of sows artificially inseminated with semen from or mated to Landrace boars (Chi-squared = 2.66 with 1 d.f.).

The effect of sperm dose on farrowing rate and litter size was next examined for Large White and Landrace boars separately. Results are presented in Table II. It appeared that for both breeds of boar

TABLE II
THE EFFECT OF SPERM DOSE ON THE FARROWING RATE AND MEAN LITTER SIZE OF ARTIFICIALLY INSEMINATED SOWS

Breed of boar	Sperm dose × 10^9	Total inseminated	Total farrow	Per cent. farrow	Mean litter size	
					Total born	Total born alive
Large White	1– 5	4	3	75	14·0	11·0
	6–10	63	54	86	10·9	10·1
	11–15	41	36	88	11·4	9·9
	16+	25	23	92	10·7	9·6
Landrace	1– 5	6	3	50	8·3	6·3
	6–10	16	9	56	7·4	6·2
	11–15	9	7	78	9·4	9·1
	16+	3	2	67	11·5	10·0

* d.f. = degree(s) of freedom.

TABLE I
THE FERTILITY OF BOARS USED FOR ARTIFICIAL INSEMINATION AND NATURAL SERVICE

Breed of boar	Boar code number	Artificial insemination			Natural service		
		Total inseminated	Total farrow	Per cent. farrow	Total mated	Total farrow	Per cent. farrow
Large White ...	3	19	17	89	3	2	67
	24	28	24	86	24	20	83
	31	29	28	97	28	20	71
	33	26	20	77	16	14	88
	36	21	19	90	9	4	44
	37	10	8	80	3	2	67
	Total	133	116	87	83	62	75
Landrace ...	4	5	3	60	4	4	100
	21	9	4	44	16	13	81
	27	9	5	55	22	14	64
	34	11	9	82	16	14	88
	Total	34	21	62	58	45	77

there was a tendency for farrowing rate to increase along with sperm dose. The total deviation of the farrowing rate of each group from a constant ratio was calculated and for both breeds of boar found to be non-significant. (Total Chi-squared, L.W. boars = 2.47 with 3 d.f. and L.R. boars = 1.50 with 3 d.f. In neither boar breed group was a preponderance of the variance supplied by any one sperm dose group).

It was also clearly evident that there was no correlation between litter size and sperm dose and no test was applied. It appeared, however, that smaller litters resulted from inseminations with Landrace than with Large White semen.

Since it was shown that variation of sperm dose within the range used had no effect on farrowing rate it was possible to pool data for all sows before the effects of other factors were examined.

To examine the effect of breed of sow on farrowing results sows were grouped for convenience into 5 groups. Group 1 consisted of pure-bred Landrace sows, Group 2 of sows with Landrace, Large White and Wessex blood, Group 3 of sows with Landrace and Wessex blood, Group 4 of sows with Landrace and Large White blood and Group 5 of sows with Large White and Wessex blood.

Farrowing results and litter sizes of sows of various breeds and crosses inseminated with semen from Large White and Landrace boars are shown in Table III. The total deviation of each breed group within each boar breed group was calculated and found to be non-significant. (Total Chi-squared, L.W. boars = 1.76 with 3 d.f. and L.R. boars = 0.82 with 1 d.f.).

farrowing results of sows inseminated less than 4 days and more than 6 days after weaning were examined and the results are presented in Part II of the analysis.

Finally, the effect of lactation age (*i.e.* the number of litters previously produced by the sow) on farrowing rate and litter size was examined and results are presented in Table IV. Since culling of sows for infertility and other factors proceeded continuously this tended to mask the true effect of lactation age on both farrowing rate and litter size. Hence it was not considered justifiable to submit the results to statistical analysis.

TABLE IV
THE EFFECT OF LACTATION AGE ON THE FARROWING RATE AND MEAN LITTER SIZE OF ARTIFICIALLY INSEMINATED SOWS

Breed of boar	Number of previous litters	Total inseminated	Total farrow	Per cent. farrow	Mean litter size	
					Total born	Total born alive
Large White	1	7	7	100	9·0	8·6
	2– 3	56	52	95	10·7	9·1
	4– 5	36	27	75	11·4	10·3
	6– 7	22	21	95	11·0	9·2
	8– 9	11	8	72	11·1	8·9
	10+	1	1	100	12·0	12·0
Landrace	1	1	1	100	10·0	9·0
	2– 3	16	12	75	9·0	8·2
	4– 5	4	1	25	12·0	11·0
	6– 7	3	0	0	0	0
	8– 9	5	3	60	8·7	8·0
	10+	5	4	80	11·0	10·0

TABLE III
THE EFFECT OF BREED OF FEMALE ON THE FARROWING RATE AND MEAN LITTER SIZE OF ARTIFICIALLY INSEMINATED SOWS

Breed of boar	Breed of sow	Total inseminated	Total farrow	Per cent. farrow	Mean litter size	
					Total born	Total born alive
Large White ...	LR LR × LR × LR × WS	50	44	88	10·4	9·5
	LR × LW × WS LW × LR × WS LR × LW × LW × WS	24	23	96	13·0	11·7
	LR × WS LR × LR × WS	41	33	80	11·6	10·5
	LR × LW LW × LR	18	16	89	9·4	8·6
Landrace ...	LR × LW LW × LR	11	8	73	9·0	7·6
	LW × WS LW × LW × WS	23	13	57	8·4	7·8

All sows included in Part I of the analysis were inseminated on the 4th to 6th days after weaning their litters. Of 91 sows inseminated on the 4th day, 70 on the 5th day and 6 on the 6th day, 73 or 80 per cent., 59 or 84 per cent., and 5 or 83 per cent. respectively, farrowed. A Chi-squared test was not applied since the 6th day Group was small and the farrowing results within each group were so similar that it was considered a test was superfluous. The

(b) *Part II.*

Since it was shown from the analysis of results in Part I that none of the factors examined except breed of boar had any significant effect on farrowing rate it was concluded that all sows within each boar breed treatment group could with confidence be pooled. These groups were then compared with groups of sows which lost semen at insemination; in which catheter penetration was "intrauterine"; and

which were inseminated less than 4 and more than 6 days after weaning their litters.

First the effect of loss of semen at insemination was examined. No attempt was made to estimate the volume of the loss. Of 162 sows inseminated with semen from Large White boars, 133 lost no semen and of these 116 or 87 per cent. farrowed. On the other hand 29 sows lost semen and of these 24 or 83 per cent. farrowed. The difference was not significant (Chi-squared = 0.44 with 1 d.f.). Of 42 sows inseminated with semen from Landrace boars 34, of which 21 or 62 per cent. farrowed, lost no semen and 8, of which 6 or 75 per cent. farrowed, lost semen. Again the difference was not significant (Chi-squared = 0.54 with 1 d.f.).

Of 162 sows inseminated with semen from Large White boars, catheter penetration was "deep cervical" in 133 sows, of which 116 or 87 per cent. farrowed, and "intrauterine" in 29 sows, of which 16 or 58 per cent. farrowed. The difference was highly significant at $P<0.001$ in favour of the sows in which penetration was "deep cervical" (Chi-squared = 14.69 with 1 d.f.). On the other hand of 60 sows inseminated with semen from Landrace boars, catheter penetration was "deep cervical" in 34 sows, of which 21 or 62 per cent. farrowed, and "intrauterine" in 26 sows, of which 9 or 37 per cent. farrowed. The difference was again significant at $P<0.05$. (Chi-squared = 4.33 with d.f.).

Finally, the farrowing results of sows inseminated on the 4th to 6th days after weaning were compared with those of sows inseminated less than 4 and more than 6 days after weaning. Of 9 sows inseminated less than 4 days, 167 sows inseminated on the 4th to 6th day and 49 on days following the 6th, 4 or 44 per cent., 137 or 82 per cent. and 32 or 65 per cent. respectively, farrowed. There was a significant difference between the farrowing results at $P>0.01$. (Total Chi-squared = 10.76 with 2 d.f. and the contributions of each of the three groups were 5.223, 2.240 and 3.292).

Discussion

Although a considerable body of data, mostly in the form of results of field trials, exists about the effects of various factors thought to influence the farrowing rate of artificially inseminated sows and gilts, the common practice has not been to draw conclusions from the farrowing results of a sample of sows from which as many variables as possible were eliminated, but to analyse all data in terms of one variable whilst all other variables were pooled. Therefore, the present experiment was planned to eliminate as many variables as possible so that in the analysis of results the effects of a few variable treatments could be evaluated.

It was planned that method of oestrus diagnosis, semen collection method, catheter design, diluent, semen volume and inseminator should be common to all sows. Circumstances did not permit the use of only one breed of sow but it was planned to compare the fertility of Large White and Landrace boars, and the effect of inseminating various numbers of sperms on farrowing rate. The interval between weaning and insemination, depth of penetration of catheter and semen loss at insemination could not be predetermined but their effect on farrowing rate was examined in the analysis of the results.

(a) *The Breed of Boar and Sow*

It was clearly shown that insemination with semen from Landrace boars resulted in a significantly lower farrowing rate than when semen from Large White boars was used. Little information is available as to the comparative fertility of boars of the 2 breeds. Madden (1959) claimed a difference of only 1 per cent. in favour of the Large White breed, nevertheless Cray (1960) made it clear that generally under natural mating conditions Landrace boars had a lower conception rate than Large White boars irrespective of the breed of sow.

There is also a great lack of information on the comparative fertility of various breeds and crosses of sow. A communication from Cray (1960) indicates that the farrowing rate to first service of sows of various breeds and crosses is closely similar.

(b) *Number of Sperms Inseminated*

Recommendations have been made by various authors as to the number of sperms required to produce pregnancy. Ito *et al.* (1948) claimed that 5×10^9 sperms were necessary, Du Mesnil du Buisson (1956) 6×10^9 and Polge (1956) showed that the conception rate of artificially inseminated pigs did not fall unless the sperm dose was less than 2×10^9. Aamdal *et al.* (1957) claimed that 5.3×10^9 to 1×10^{10} sperms were necessary to achieve pregnancy and Gusev (1959) showed that maximum fertility resulted from inseminations with 1×10^{10} sperms. Wiggins *et al.* (1951), on the other hand, stated that fertilised ova were recovered from animals inseminated with 1.6×10^6 sperms, but that the fertilisation rate rose as the sperm dose was increased to 5.8×10^8 with gilts and 2.3×10^8 with sows. Further increases in sperm dose were not, however, reflected in increased fertility. All these workers used different diluents.

No reports have been published of artificial insemination carried out with sperm doses as low as those used by Wiggins *et al.* (1951), and generally recommendations fall within the range of 2×10^9 to 6×10^9 sperms.

The smaller the sperm dose necessary to achieve pregnancy the larger the number of sows which can be served from one ejaculate and the more intensive the use which can be made of a boar; and where boars of high genetic worth are used in artificial insemination studs it is important that they are used as widely as possible. Radford (1959) showed that a mature Large White boar collected from every second or third day, produced approximately 50 to 55×10^9 sperms which on the basis of the recommendations of most workers was sufficient to inseminate 9 sows per ejaculate or 1,100 sows annually. This compares unfavourably with the extensive use which can be made of a bull, semen from which can be used to inseminate some 15,000 cows annually or about 14 times more females than can be covered with semen from one boar. To increase the intensity

of usage of a boar to that of a bull would mean that each sow would be inseminated with 3 x 10^8 sperms. Fertilisation was achieved with this dose by Wiggins *et al.* (1951), but it is one tenth and one thirtieth the doses recommended by Polge (1956) and Gusev (1959) respectively. In the experiments described here no correlation was demonstrated between sperm dose and farrowing rate where sperm dose was in the range of 3 x 10^9 to 30 x 10^9. This appeared to confirm the conclusion of Polge (1956) but to refute that of Gusev (1959).

In the interest of the more efficient use of boars it is important to investigate the reasons for the necessity of a high sperm dose and to attempt to reduce the threshold level either by more efficient insemination techniques or new diluents which ensure sperm longevity at high dilution rates.

(c) *Loss of Semen at Insemination*

In a controlled experiment to determine the effect of depth of penetration of catheter on conception rate at slaughter, Hancock (1959) showed that when a 3 mm. catheter was passed into the uterus, semen rarely flowed back and the conception rate, as measured by the total sows with fertilised ova at slaughter, was 90 per cent. On the other hand, when the catheter penetrated only into the cervix or vagina, there was invariably a loss of semen at insemination with a correlated fall in conception rate. In a further experiment Hancock showed that when sows were inseminated with the cuffed plastic catheter, there was invariably loss of semen and a conception rate similar to that obtained from cervical insemination with a 3 mm. diameter catheter. Thus, results indicated that loss of semen was correlated with inefficient insemination techniques and a lower conception rate.

On the other hand Holt (1959) showed that, whereas a 3 mm. diameter catheter gave a higher farrowing rate than did thicker instruments, loss of semen had no effect on farrowing rate. No data were given about the effect of catheter diameter on semen loss at insemination.

In the experiment described here it was clearly shown that, when the cuffed plastic catheter was used, there was no correlation between loss of semen at insemination and farrowing rate.

(d) *Depth of Catheter Penetration*

In an experiment designed to examine stage of oestrus and catheter penetration Melrose and O'Hagan (1960) catheterised sows at intervals during the oestrus cycle with an instrument of similar dimensions to the cuffed plastic catheter described by Aamdal *et al.* (1957). Depth of penetration was recorded and it was found that greatest penetration was possible in mix-cycle, thus indicating that at oestrus the cervix contracted.

It was shown here that in sows where the catheter penetrated only into the cervix there was a significantly higher farrowing rate than in sows where the catheter was advanced into the uterus. This, taken in conjunction with the results reported by Melrose *et al.* (1960) indicated that sows where catheter penetration was "intrauterine," were probably not fully in oestrus.

(e) *The Interval between Weaning and Insemination*

Whilst most workers agree that sows come into oestrus 3 to 7 days after weaning their litters, no information is available as to whether there is any correlation between length of interval and farrowing rate. Madden (1959) stated, however, that fertility is probably highest if sows are inseminated within 5 days of weaning. It was clearly shown in the work described here that sows inseminated on the 4th to 6th day after weaning had a significantly higher farrowing rate than sows inseminated less than 4 or more than 6 days after weaning.

(f) *General*

It appears from this experiment that where the boar is used to detect oestrus the farrowing rate of artificially inseminated sows can be expected to be as high as naturally mated sows. It is not certain, however, whether the high farrowing rate of the artificially bred sows was due to the correct timing of insemination or to the intense sexual stimulation received by sows through teasing and through being inseminated within the sight and smell of the boars. Work by Pitkjanen (1955, 1958) indicated that mating stimulated ovulation and accelerated the passage of sperms along the female reproductive tract. If this is substantially true it could account in some measure for the generally disappointing results of artificial insemination experiments in the field where in the majority of cases no boar is present on the farm.

Since sperm dose within the range used was shown to have no effect on farrowing rate further work could usefully be directed towards determining how few sperms can be used without depressing the farrowing rate. In this way alone the efficiency of the use of boars would be greatly increased.

Acknowledgments.—Without the facilities provided by Cow & Gate Farms Ltd., this work would have been impossible. Encouragement, help and assistance have been given without stint by A. S. Cray, Esq., M.B.E., J.P., the Managing Director, whose advice has been invaluable. J. Weinstein, Esq., also of Cow & Gate Farms Ltd., gave most valued help in compiling the figures. P. H. Sedgwick, Esq., was responsible for all the inseminations and the success of the work is in no small measure due to his enthusiasm. The co-operation and advice of A. Franke, Esq., Farm Manager, have also been greatly appreciated. Richard Ivens has done much thorough work in the laboratory.

G. M. Clarke, Esq., the statistician at the Long Ashton Research Station, has given many hours of his valuable time in helping with the statistical analysis of results.

References

AAMDAL, J. (1959). *Ann. Zootech* (Paris). **8** (Suppl.). 7.
——— & HOGSET, I. (1957). *J. Amer. vet. med. Ass.* **131.** 59.
———, ———, SVEBERG, O., & KOPPANG, N. (1958). *Ibid.* **132.** 101.
ASDELL, S. A. (1938). Cornell Extension Bulletin. 305 (Reprint).

(*Concluded at foot of page opposite*)

Symposium of Zoo Animal Pathology

From a Correspondent

THE Third International Symposium of Zoo Animal Pathology was held at Cologne from April 14th to 17th, 1961. About 100 people attended from 12 countries, the majority coming from Germany; the British contingent had increased this year to a total of 3. The official languages were German and English.

The scientific meetings were held in the newly erected meeting hall of the Cologne Chamber of Commerce and the theme on the first day was Parasitic Diseases of Zoo Animals. The first paper was presented by Professor H. Enigk of Hanover and took the form of a marathon review of methods for controlling parasitic infestation of every kind in zoological parks. The comparative rarity of trematodes and cestodes due to the absence of their intermediate hosts and the wide distribution of nematode parasites was referred to. Much information was given on the use of traditional and modern anthelmintics followed by an account of soil disinfestation methods using gaseous disinfectants or a mobile steam-producing plant. The importance of employing an agent which will dissolve the waxy covering of roundworm eggs when cleaning cages was emphasised by experimental data. Several references were made to Hygromycine B as a valuable though toxic anthelmintic.

A two-part paper on parasitic infestations of snakes was presented by Mr. Fiennes and Mr. Jones of The Zoological Society of London. The main types of parasitic infestation were listed as 1. Haemogregarines, 2. Amoebiasis, 3. Nematodiasis including ascarids, strongyles, filarioids, rhabdias and spiruroids, 4. Acanthocephalid infestations, 5. Cestode infestations with Ophiotaenia and Crepidobothrium sp., 6. Arthropod infestations including Porocephalus and Acarine mites. It was suggested that entamoebiasis may be spread by cockroaches and that Dieldrin-impregnated wall strips are a valuable means of control. The action of *Polydelphis* sp. in initiating gastric abscesses was discussed and the possible pathogenic rôle of Haemogregarine infestations. Mr. Jones continued the paper with a review of therapeutic methods employed for ecto and endoparasitic diseases. Particular reference was made to frequency of "scale mite" infestation due to *Ophionyssus natricis* which may carry infections from snake to snake causing subcutaneous abscesses and possibly transmitting entamoebiasis. Control measures include hygiene, quarantine and monthly dressings with bland oils. Piperazine and phenothiazine were recommended as the drugs of choice for ascarids and strongyles respectively and dichlorophen for cestodes. (The dosages suggested

---

The Results of an Artificial Insemination Experiment Within a Single Pig Breeding Herd.—*Concluded.*

BURGER, J. F. (1952). *Onderstepoort J. Vet. Sci.* Suppl. No. 2.
CORONEL, A. B. (1954). *Philipp. J. Anim. Ind.* **14.** 227. (*Anim. Breed. Abstr.* **23.** 267.)
CRAY, A. S. (1960). Private communication.
DAUZIER, L., & DU MESNIL DU BUISSON, F. (1958). *Rev. Elev. Prod. Anim.* **13.** 857. (*Anim. Breed. Abstr.* **27.** 84.)
DU MESNIL DU BUISSON, F., & DAUZIER, L. (1956). *Pap. 3rd int. Congr. Anim. Reprod.* (*Camb.*), Sect. 3, 62.
DZIUK, P. J., & HENSHAW, G. (1958). *J. Anim. Sci.* **17.** 554.
FOOTE, R. H., YOUNG, D. C., TURKHEIMER, A. R., & BRATTON, R. W. (1959). *Ann. Zootech.* (Paris). **8** (Suppl.). 27.
GOTINK, W. M. (1959). *Tijdschr. Diergeneesk.* **84.** 163. (*Anim. Breed. Abstr.* **27.** 328.)
GUSEV, L. V. (1959). *Zivotnovodstvo.* **21** (9). 53. (*Anim. Breed. Abstr.* **28.** 287.)
HANCOCK, J. L. (1959). *Vet. Rec.* **71.** 523.
HESS, E. A., LUDWICK, T. M., & TEAGUE, H. S. (1959). *Ann. Zootech.* (Paris). **8** (Suppl.). 31.
HOLT, A. F. (1959). *Vet. Rec.* **71.** 184.
ITO, S., NIWA, T., KUDO, A., & MIZUHO, A. (1948). Res. Bull. 55, Zootech. Exp. Sta., Chiba, Japan.
JAKOBSEN, F. (1959). *Ann. Zootech.* (Paris). **8** (Suppl.). 37.
KVASNICKII, A. V., & KONJUHOVA, L. A. (1958). *Vestn. selhorj. Nauk. Vashnil* (*Mosk*). **3** (5). 68. (*Anim. Breed. Abstr.* **27.** 213.)
KRALLINGER, H. F., & SCHOTT, A. (1933). *Arch. Tierenahrung und Tierzucht.* **9.** 41.
KRONACHER, C. (1927). *Allgemeine Tierzucht*, 4, *Abteilung.* **8.** 304/5.
LAURANS, R., & MAULEON, P. (1952). "Quelques Nouveaux Aspects de l'Insemination Artificielle." Centre Zootechnique de Rambouillet.
MADDEN, D. H. L. (1959). *Vet. Rec.* **71.** 227.
———. (1959). *Ann. Zootech.* (Paris). **8** (Suppl.). 59.
MELROSE, D. R. (1960). Private communication.
——— & O'HAGAN, C. (1960). Private communication.
MARSHALL, F. H. A., & HAMMOND, J. (1937). Min. of Agric. and Fisheries, London Bull. 32.
NIWA, T. (1958). "Artificial Insemination with Swine in Japan." Paper prepared for Tour of United Kingdom.
———, ITO, S., KUDO, A., MIZUHO, A., & SOEJIMA, A. (1959). *Ann. Zootech.* (Paris) **8** (Suppl.). 97.
PITKJANEN, I. G. (1955). *Izr. Akad. Nauk. SSSR. Ser. biol.* **3.** 120. (*Anim. Breed. Abstr.* **24.** 247.)
———. (1958). *Trud. Puskin, Naue-Issled. Lab. Razved. Selhoz., Zivotn.* No. 8. 98. (*Anim. Breed. Abstr.* **27.** 929.)
POLGE, C. (1956). *Vet. Rec.* **68.** 62.
———, & ROWSON, L. E. A. (1956). Ann. Congr., B.V.A.
RADFORD, P. (1959). Ph.D. Thesis, Bristol.
———, & HERDAN, G. (1961). *Vet. Rec.* **73.** 759.
RODIN, I. M., & LIPATOV, V. I. (1935). *Probl. Zivotn.* **9.** 108. (*Anim. Breed. Abstr.* **4.** 205.)
SELF, H. L., & GRUMMER, R. H. (1958). *J. Anim. Sci.* **17.** 862.
STOWER, J., & BUD-HUSAIM, P. (1957). *J. Agric. Sci.* **49.** 220.
STRUVE, J. (1911). Fuhlings Landwirtscaft. Ztg. LX.
WILLEMS, C. M. (1959). *Tijdschr. Diergeneesk.* **84.** 208. (*Anim. Breed. Abstr.* **27.** 331.)
WIGGINS, E. L., GRUMMER, R. H., & CASIDA, L. E. (1951). *J. Anim. Sci.* **10.** 138.

were Entamide 500 mg. per kg., Piperazine Citrate 100 mg. per kg. and Dichlorophen 200 mg. per kg.). In conclusion control methods were discussed including the routine medication of all new arrivals.

A paper by Professor Boch of Berlin concerned the use of modern anthelmintics in zoo animals and recommended the combined use of phenothiazine and piperazine in some ungulates. Professor Boch maintained that ascarids were of more importance in carnivores than is sometimes believed and advised 200 mg. per kg. of piperazine disguised in meat.

Dr. Kraft of Munich made the refreshing statement in this company that parasites were present in almost all wild animals and were not necessarily evidence of disease. In describing the results of serial faecal examinations on several hundred mammals he had encountered cysticercosis and haemonchosis in chinchillas, cardiac filariae in seals and coccidiosis in certain felines. Kraft referred to colic in zebras under treatment for ascariasis, the value of phenothiazine in ruminants where it gave more consistent results than other drugs, and the importance of minerals and vitamins, especially vitamin A, in building up resistance to parasitic infestations.

Von Schmitt of Frankfurt am Main gave an account of the transfusion of human blood to a chimpanzee. The literature of the subject is scanty but reference was made to early work by Landsteiner, Troisier and more recently by Spielman. Exhaustive compatibility tests were made in this case but the transfusion was not successful and the chimpanzee died.

Professor Potel and his colleagues from Leipzig ended the first day's deliberation with a "round-table" discussion of a recent outbreak of disease involving all 7 of the elephants at Leipzig Zoo. The 4 Indian elephants were most severely affected and 2 died while all 3 African elephants recovered. Symptoms and pathology were typical of an epitheliotropic virus disease and a large pox-like virus was recovered which gave cross-reactions only with smallpox of the viruses tested. It appears that non-specific factors influenced the severity of the disease; one of the two elephants which died showed chronic circulatory deficiency at *post-mortem*, the other being a new arrival still suffering the effects of travel.

Professor Fitzsche of Coblenz made an extensive review of the more important diseases of birds in zoological parks. Psittacosis and ornithosis were discussed in detail. Up to 80 per cent. of parrakeet stocks in the U.S.A. were said to be affected, and over 8 per cent. of zoo budgerigars examined. (In Germany?) Latent carriers may excrete the virus for up to 200 days and symptoms are generally very slight in budgerigars except nestlings. Up to 50 per cent. of wild pigeons may be affected and conjunctivitis, rhinitis and lameness are important symptoms. The disease in ducks has led to human infections in Germany and Czechoslovakia. Oxytetracycline and erythromycine appear to be the antibiotics of choice for therapy.

A contribution by E. C. Appleby on Mycosis of the Respiratory Tract in Penguins was then given. This account was based on an analysis of over 400 deaths in penguins at Edinburgh Zoo during the period 1915-1958, 126 of which had been examined *post-mortem* by the author. Respiratory mycosis, usually due to *Aspergillus fumigatus*, was by far the most important disease, being responsible for at least 160 of these deaths and probably far more. The incidence, symptoms, treatment and pathology of the disease were discussed and it was concluded that loss of condition is probably an essential precursor. Reference was also made in passing to alimentary obstruction with foreign bodies, gastritis due to streptocara infestation, visceral gout, renal agenesia, renicola infestation of the kidneys and prolapse of the oviduct. Among bacterial diseases mentioned were erysipelas, pasteurella and staphylococcal infections.

Dr. Geyer of Munich followed with an account of clinical methods used in small birds. Among the important conditions mentioned were opisthotonus in young birds successfully treated with vitamin B complex, mite infestation of the lungs treated with aerosols, and thyroid enlargement in budgerigars said to occur in 35 per cent. of birds in one survey in an iodine-deficient area. The treatment for this condition was 1 part iodine in glycerine to 9 parts liquid paraffin. Intestinal and ectoparasites were said to be rare in cage birds, and most tumours encountered were benign lipomas, but renal carcinoma and basilioma and spindle cell sarcoma of the beak also occurred.

Several suspected cases of Newcastle Disease in ostriches were described by Dr. Kloppel of Frankfurt am Main. Several cases had been seen over a period of years in which nervous symptoms were shown. In those which died haemorrhagic lesions were present. In later cases (following vaccination?) Newcastle virus was recovered from the brain.

Dr. Pruski of Warsaw analysed 40 case reports on ostriches. Seven deaths were due to infectious diseases including anthrax, tuberculosis and salmonellosis, 32 to non-specific causes and one was inconclusive. The digestive tract was the system most commonly affected.

The last paper was given by Dr. Zwort of Utrecht who gave an account of trichomoniasis in small birds where the disease can cause serious losses. He described nervous disease seen typically in birds of paradise and suggested avitaminosis E and selenium deficiency as possible causes having had some success in treatment with vitamin E. In penguins *Cotillus variegatus*, a parasite normally found in gulls, may cause serious losses, being present in the peritoneal cavity and the intestine: carbon tetrachloride has been used with good effect.

Copies of almost all the papers mentioned above, and translations into English of a few, are available (through the Editor of THE VETERINARY RECORD) for reference, to interested persons.

News and Comment

THE QUEEN OPENS NEW SURGICAL WING AT A.H.T. EQUINE RESEARCH STATION

The Queen honoured the Animal Health Trust by opening the new Gladys Yule Surgical Wing last Friday morning, September 29th. By Her Majesty's wish the occasion was comparatively informal, and it was a particular happiness to the guests to see the Queen's pleasure and interest in visiting the Station, and to notice how well and relaxed she seemed to be. On her arrival she was greeted by the Duke of Norfolk, President of the Trust, who was accompanied by the Duke of Devonshire, the Trust's honorary treasurer, Dr. W. R. Wooldridge, the founder, Mr. William C. Miller, director of the Station, and other notabilities.

In addressing the Queen the Duke of Norfolk said:—

"I have the privilege this morning, on behalf of all those concerned with the Animal Health Trust, to welcome you here to Balaton Lodge, though not on your first visit.

"The Equine Research Station, as I think your Majesty knows, is only one part of the Animal Health Trust; Prince Philip very kindly came to the Farm Livestock Research Centre in Essex and opened there certain buildings.

"I believe that those who see this new wing this morning may well consider it, if not the finest in the world, certainly the best in the Commonwealth and in Europe. It will carry out the functions and further the research which is so badly needed; and if by any chance your Majesty may see a donkey inside, it is because its sight has been restored and that is the kind of research for which this place is working.

"Gladys Yule did a great deal for us here, and it is right and proper that her name should be remembered; and in asking your Majesty to perform the opening ceremony, I would like to assure you on behalf of the horse world as a whole, of our indebtedness to the interest you take. What we learn here to-day and to-morrow, may help the animals and horse lovers for years to come."

The Queen, accompanied by her personal entourage, then toured the building, followed by members of the Trust's council. Later the guests were invited to inspect it also.

A note in the day's official programme gives these brief details of the new Wing:—

Designed and equipped on the most up-to-date lines, the Unit will provide all those facilities so necessary in present-day equine surgery. These ensure rigid aseptic conditions, cause the minimum of tissue damage and hasten healing by "first intention."

Modern techniques also cater for the unusual manipulative difficulties posed by the weight and strength of the horse. Accidents to horses—and their attendants—can occur so readily, even under the best operating conditions. The new surgical unit has been designed not only with these considerations constantly in mind, but also to allow for the development of certain equine surgical operations which cannot be carried out without special technical facilities.

The unit consists of an operating theatre with a mechanically controlled operating table, a movable casting and anaesthetising bed and an overhead travelling hoist to enable the unconscious horse to be moved to the operating table and thence, after operation, to a padded and specially prepared recovery box, where the risks of self-inflicted damage during recovery of consciousness and of full neuro-muscular co-ordination are reduced to the lowest proportions.

The Queen, with Dr. Wooldridge and Mr. Miller.

Facilities also exist in a large bay adjoining the surgical theatre for examining horses, and for carrying out routine dressings and cardiological ophthalmoscopic and X-ray examinations.

The building is in fact self-contained with essential ancillary accommodation for washing, drying, sterilising and storage, plus a laboratory-preparation room, offices, etc. Four loose-boxes are also provided for horses in various stages of convalescence.

The building, designed in collaboration with the Station's director and Mr. E. James Roberts, head of the clinical department, is the creation of the same firm of architects, Messrs. Dyneley Luker & Moore, who produced the Trust's Farm Livestock Research Station. It is a building of pleasant modern, but not unconventional form, well suited to its immediate surroundings. The interior is beautifully light and spacious, and the colours chosen for the decor are tasteful and agreeable to a degree. The apparatus appears to be among the best avail-

able, and readers will learn with interest that the anaesthetic apparatus is based upon designs perfected by Mr. Sydney Jennings, senior vice-President of the B.V.A. It is intended to publish a separate note on this next week.

This was not only a great occasion for Dr. Wooldridge and the Trust, but a most happy one for everybody concerned. The organisation was excellent; everything went without a hitch; the hospitality was generous, and the company of the best, including the President of the Royal College and many of the most distinguished members of the profession.

OPENING OF NEW QUEENSLAND VETERINARY SCHOOL

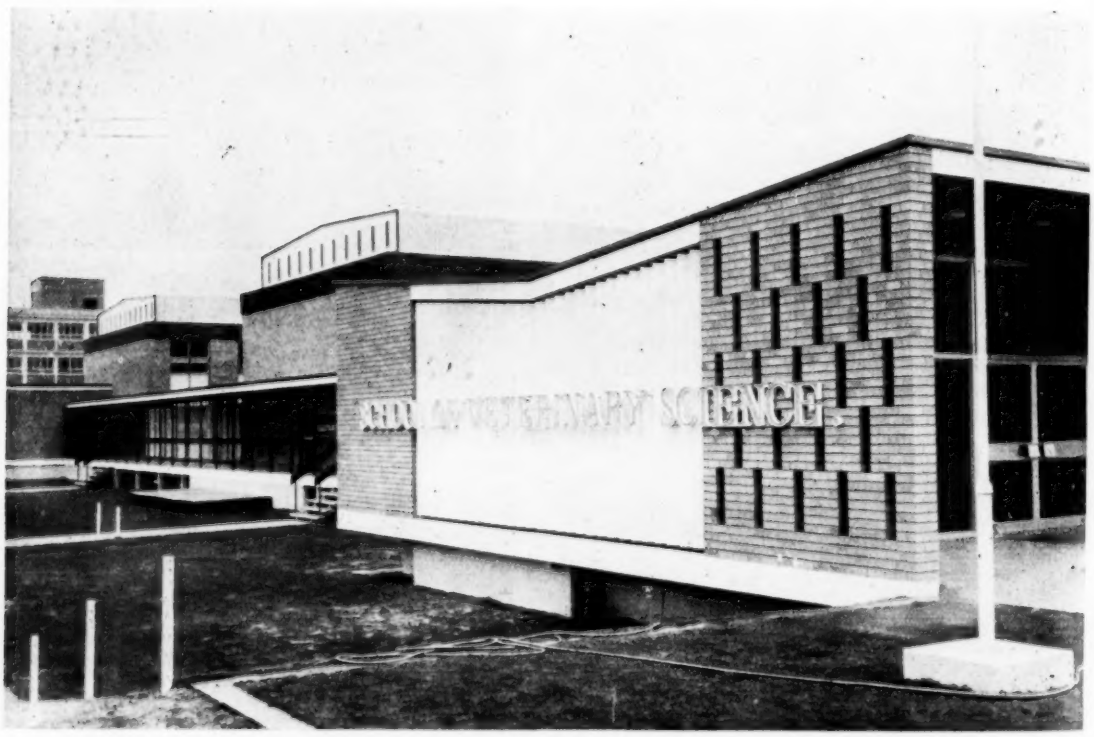
The official opening of the new School of Veterinary Science at the University of Queensland, was carried out by the Minister for Primary Industry on August 10th, 1961. The opening coincided with the 25th anniversary of the establishment of the Faculty.

The Chancellor of the University (Sir Albert Axon) welcomed the gathering of approximately 500 guests and pointed out that veterinary science enrolments had more than doubled in the last 4 years. Students were attending from New Zealand, Asia, Africa, Europe, America and New Guinea as well as from Queensland. Sir Albert referred also to the keen pleasure felt at the presence of the first Dean of the Faculty, Professor H. R. Seddon.

The Minister, in officially opening the new School, paid tribute to the work being done by veterinary surgeons in the various branches of the profession. He warned that Australia's acute shortage of veterinarians could affect its export markets. This shortage had come at a time when countries importing animal products were insisting on even higher standards of quality and hygiene.

The Minister referred to the formation of a committee representing the Agricultural Council, Australian Veterinary Association and the Universities Commission to investigate and recommend measures to relieve the shortage of veterinarians. He expressed his pleasure that the new facilities would permit expanded post-graduate teaching and research, as well as better training for undergraduates.

The Dean of the Faculty (Professor J. F. A. Sprent) in thanking the Minister emphasised that the result of the generous support of the Commonwealth and State Governments had been the completion of Stage I and the transference of veterinary teaching and research within the gates of the main university. Professor Sprent pointed out that in the past many veterinary appointments had been filled by overseas graduates, but that the time was fast approaching when Australia would be entirely dependent on its own educational resources. He stated that the staff and students of the new school had now unrivalled facilities for the study of veterinary science, particularly in the tropical environment.



At the conclusion of the opening ceremony the university entertained the guests to afternoon tea in the veterinary school quadrangle, after which an inspection of the new building was made.

25th Jubilee Celebrations

To mark the 25th celebration of the establishment of the Faculty of Veterinary Science of Queensland University, the present Faculty invited Professor H. R. Seddon, first Dean of the Faculty, to be the official guest and to deliver the jubilee oration.

Dr. Seddon was entertained at dinner by the Dean and members of the Faculty together with former students. In proposing a toast to him the Dean referred to the difficult times through which the early Faculty had passed and to the effective and vigorous leadership given to it by Dr. Seddon, until war caused its closure. The Dean read a number of greetings from former students.

Dr. Seddon, in reply, referred to his pleasure at being back in Queensland and recalled some of his early experiences. It was a particular pleasure to see many of his former students again, and he sincerely thanked the Faculty for its invitation to be present.

Jubilee Oration

An audience of over 100 heard Professor Seddon deliver the Jubilee Oration in the Public Lecture Theatre on August 10th, 1961. It is intended to publish it in full in the *Australian Veterinary Journal*.

THE REGISTER OF VETERINARY SURGEONS

The undermentioned gentlemen were admitted to membership of the Royal College on September 29th, 1961, in virtue of the registrable degree of B.V.Sc., conferred on them by the University of Liverpool:—

Bush, Michael Barry, 76, Baginton Road, Styrechale, Coventry, Warwicks.; Llewellyn, Gareth, School House, 3, Cadoxton Road, Neath, Glam.; Quartey-Cofie, Joseph Emmanuel (*in absentia*), c/o P.O. Box 49, Mamprobi, Accra, Ghana; Williams, Gareth Vaughan, 5, Ael-y-Bryn Road, Colwyn Bay, Denbighshire.

THE R.C.V.S. DISCIPLINARY COMMITTEE

A meeting of the Disciplinary Committee of the Royal College of Veterinary Surgeons was held at the Law Society on September 20th and 21st. Mr. T. M. Mitchell was in the chair.

Mr. John Leo O'Connell

The committee first dealt with this case. Evidence had been heard at the previous meeting, when three counts of driving under the influence of drink, negligent driving, and failing to show a light on a parked car during the hours of darkness were found proved.

The chairman, speaking for the committee, gave Mr. O'Connell a severe admonition, and added that it appeared that the intoxication had been aggravated by the use of drugs which he had been taking at the time for illness.

Mr. Felix F. Berger

The committee considered seven charges of conduct disgraceful in a professional respect against Mr. Felix F. Berger, a veterinary surgeon practising at Great Horkesley, Essex.

Mr. P. Baylis, solicitor, appearing for the Royal College, stated that Mr. Berger was engaged by Mr. Robert Crawford first as a locum tenens and subsequently as an assistant. Upon termination of that employment on September 17th, 1960, Mr. Berger had set up in practice on his own account approximately five miles distant. He had then canvassed four clients of his former principal and attempted to obtain for himself fees for professional services rendered to a client before September 17th. The sixth charge alleged that he committed the same offence in respect of another of Mr. Crawford's clients, and finally that he rendered services to the same client after September 17th, knowing him to be a client of Mr. Crawford.

Eight witnesses were called by Mr. Baylis.

One witness, Mr. E. C. Kerridge, gave evidence that Mr. Berger approached him and handed him his professional card saying "if I required his services to ring him."

Mr. Hyamson, counsel, appearing for Mr. Berger, suggested in cross-examination that the witness regularly sold potatoes to Mr. Berger, and the card was given in order that payment could be sent.

Two further witnesses testified that Mr. Berger presented them with his card.

Giving evidence, Mr. Berger denied all the charges. He said that all his actions had an innocent explanation, and that mistakes had often occurred when commencing his practice, by both himself and his wife. During cross-examination he agreed that, upon leaving Mr. Crawford's employment, he was labouring under a considerable sense of injustice, in that he, Mr. Berger, had been carrying out most of the work in the practice for some time, especially during Mr. Crawford's illness.

The committee found Mr. Berger guilty on three charges of canvassing, and on two other charges. On two counts he was found not guilty.

Mr. Berger, through his counsel, gave an undertaking that he would cease to practise within a radius of 20 miles of his present practice, that he would no longer reside in the district, and that he would not sell or otherwise dispose of his present practice.

In suspending judgment for two years, the chairman said that the committee were being somewhat lenient in view of his comparative youth, the excellent testimonials produced on his behalf, and the fact that he had no other means of livelihood. The committee, however, regarded the offences as serious.

UNIVERSITY NEWS

Dublin

First Veterinary Examination, Part I

ANIMAL MANAGEMENT

ffrench Davis, Francis Conor,

Part II

ANATOMY, PHYSIOLOGY AND BIOCHEMISTRY

Scott, Peter Charles Anthony.

Liverpool

Ordinary Degree of B.V.Sc.

Bush, B. M.; Llewellyn, G.; Quartey-Cofie, J. E.; and Williams, G. V.

B.V.Sc. First Examination

PART I (CHEMISTRY)

Dudley, B.; and Evans, D. A.

PART II (PHYSICS)

Bowman, D. J.; Davies, Angela M.; Evans, D. A.; and Macdonald, F. R.

PART III (BOTANY)

Evans, D. A.; and Evans, R. P.

PART IV (ZOOLOGY)

Evans, D. A.

B.V.Sc. Third Examination

PART II

Aldridge, Margaret C.; Davies, G. E. G.; Hilton, D. W.; Summers, D.; and Williams, M. H.

PART III

Davies, G. E. G.; Strong, M. G.; and Taylor, J. K.

PERSONAL

Professor W. T. Williams has been appointed to fill a vacancy in the membership of the Agricultural Research Council caused by the retirement on October 2nd, 1961, after 10 years' service, of Professor S. J. Watson.

Births

ARMOUR.—On September 30th, 1961, to Irene, wife of James Armour, M.R.C.V.S., Lochgreen, 75, Bridgewater Road, Berkhamsted, Herts., a son, Craig, brother to Linda, Donald and Fiona.

TRIBE.—On September 24th, 1961, at 55, High Street, Brandon, Suffolk, to Shirley (*née* Punter), wife of George W. Tribe, B.V.M.S., M.R.C.V.S., a son.

VOS.—On September 30th, 1961, to Jane, wife of Paul Vos, B.VET.MED., M.R.C.V.S., 61, Derngate, Northampton, a son, Ashley Christopher.

Engagement

BAINBRIDGE—LECKEBUSCH.—The engagement is announced between Joseph Robert Bainbridge, B.V.SC., M.R.C.V.S., only son of Mr. and Mrs. R. E. Bainbridge of Ecton, Northampton, and Bärbel Leckebusch, only daughter of Herr and Frau E. Leckebusch of Niederzissen über Andernach, Germany.

Marriage

SMITH—SINNOTT.—On September 16th, 1961, at St. Mary's, Bridgend, S. Wales, Dennis Leonard Smith, B.VET.MED., M.R.C.V.S., of Braughing, Herts., to Mary Theresa Sinnott, S.R.N., of Sarn, Bridgend.

R.C.V.S. OBITUARY

We record with regret the deaths of the following members of the profession:—

CUNNINGHAM, Michael, Ballymore, Mullingar, Co. Westmeath, Eire. Captain, late R.A.V.C. Graduated from the Royal Veterinary College, Dublin, July 24th, 1911. Died at Mullingar, July 26th, 1959.

JAMES, David Lloyd, Cornel Villa, Llanybyther, Carmarthenshire, South Wales. Graduated from the Faculty of Veterinary Science of the University of Liverpool, July 16th, 1923. Died in his 70th year on September 15th, 1961, at Llanybyther.

Erratum

We are asked to say that, in Dr. Piercy's paper, An Appraisal of the Value, and Method of Use, of Living Attenuated Canine Distemper Vaccines, published last week, the word "increase" at the end of line 19, page 948, should have read "incidence."

COMING EVENTS

October

10th (Tues.). WEST WALES VETERINARY CLUB. Farewell Dinner for Mr. E. I. Williams at the Ivy Bush Hotel, Carmarthen.

11th (Wed.). B.S.A.V.A. KENT REGION. Meeting at the Great Danes Hotel, Ashford Road, Maidstone, Kent, 7.45 p.m.

B.S.A.V.A. MIDLAND REGION. Joint Meeting with the Staffs. and Derby Veterinary Club at the White Hart Hotel, Uttoxeter, 8.15 p.m.

SUSSEX VETERINARY SOCIETY. Meeting at the Old Ship Hotel, Brighton, 2.30 p.m.

EASTERN COUNTIES VETERINARY SOCIETY. Meeting at the Belstead Brook Hotel with a tour of Messrs. R. & W. Paul's mills, 12 noon.

TECHNICAL DEVELOPMENT COMMITTEE OF THE B.V.A. Meeting at 7, Mansfield Street, Portland Place, London, W.1, 10.30 a.m.

12th (Thurs.). B.S.A.V.A. SOUTH WALES REGION. Meeting at the Queens Hotel, Queen Street, Cardiff, 7 p.m.

HERTS. AND BEDS. VETERINARY SOCIETY. Meeting at the George Hotel, Luton, 7.30 p.m.

NORTH WILTS. VETERINARY CLUB. Meeting at the Goddard Arms, Swindon, 7.30 p.m.

MID-WEST VETERINARY ASSOCIATION: CLINICAL DISCUSSION GROUP. A meeting will be held at the Mauretania, Bristol, 7.30 p.m.

17th (Tues.). MID-WEST VETERINARY ASSOCIATION. Supper-Dance in aid of the Victoria Veterinary Benevolent Fund at the Berkeley Café, Clifton, 9 p.m.

18th (Wed.). SOCIETY OF PRACTISING VETERINARY SURGEONS. Joint Meeting with the Lakeland Veterinary Association and the Dumfries and Galloway Division at Siddles' Crown Hotel, King Street, Penrith, Cumberland, 8 p.m.

SOUTH EASTERN VETERINARY ASSOCIATION. Meeting at the Royal Star Hotel, Maidstone, 7.15 p.m.

SCOTTISH METROPOLITAN DIVISION. Autumn

Meeting in the Royal (Dick) School of Veterinary Studies, 2.15 p.m.

SOUTH-EAST MIDLANDS VETERINARY ASSOCIATION. Meeting at the Franklins Gardens Hotel, 7.30 p.m.

WARWICKSHIRE VETERINARY CLUB. Meeting at the Regent Hotel, Leamington Spa, 7.30 p.m.

19th (Thurs.). SOCIETY OF WOMEN VETERINARY SURGEONS. Autumn Meeting in the Department of Pathology, Liverpool University, 2.15 p.m.

WELSH BRANCH. Meeting at the Geography Department, Alexandra Road, Aberystwyth, 2 p.m.

20th (Fri.). SOUTH WALES DIVISION. Annual Dinner Dance at the Dragon Hotel, Swansea.

SCOTTISH METROPOLITAN DIVISION. Annual Dinner Dance in the Carlton Hotel, North Bridge, Edinburgh, 8.30 p.m.

NORTH OF IRELAND VETERINARY ASSOCIATION. Autumn Meeting at the Whitla Medical Institute, College Square North, Belfast, 7.30 p.m.

25th (Wed.). YORKSHIRE VETERINARY SOCIETY. Annual Dinner and Dance at the Cairn Hotel, Harrogate, 7.30 p.m.

26th (Thurs.). WESTERN COUNTIES VETERINARY ASSOCIATION. Meeting at the Rougemont Hotel, Exeter, 2.15 p.m.

27th (Fri.). YORKSHIRE VETERINARY SOCIETY. Meeting at the Parkway Hotel, Bramhope, Leeds, 2.30 p.m.

28th (Sat.). B.S.A.V.A. NORTH WESTERN REGION. Meeting at the Queen's Hotel, Manchester, 7.30 p.m.

November

2nd (Thurs.). R.A.V.C. DIVISION. Meeting at Bristol University Veterinary College.

7th (Tues.). B.S.A.V.A. REGION 3. Meeting at Allen & Hanburys, Ware. Closing date for applications, November 1st.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the date on which disease has been confirmed, followed by the postal address and local authority.

Anthrax

September 26th, 1961. Mrs. A. M. Jones, Daisy Farm, Duffryn Conin, Clynderwen, Pembs. (Parish: Llandissilio East.) (Cattle.) CARMARTHENSHIRE.

September 27th, 1961. W. Parris, Aller Farm, Upottery, Honiton, Devon (Parish: Upottery.) (Cattle.) DEVONSHIRE.

September 28th, 1961. Mrs. D. M. Goodall, Whitegate Farm, Bleadon, Weston-super-Mare, Somerset (Parish: Bleadon.) (Cattle). SOMERSET.

September 29th, 1961. G. J. Martin, Towell Farm, St. Dominic, Callington, Cornwall (Parish: St. Dominic). (Cattle.) CORNWALL.

September 29th, 1961. R. K. Brown & Sons, Eastfield Road, Dumfries. Disease at: Marchill, Moffat Road, Dumfries. (Cattle.) DUMFRIESSHIRE.

September 29th, 1961. H. S. Creed & Son, South Town Farm, West Pennard, Glastonbury, Somerset (Parish: West Pennard.) (Cattle.) SOMERSET.

September 29th, 1961. D. L. Barnes, Green Close Farm, Morcombelake, Bridport, Dorset (Parish: Whitchurch Canonicorum.) (Cattle.) DORSET.

October 2nd, 1961. E. A. Sheppard, Walnut Farm, Mark Causeway, Mark, Highbridge, Somerset. Disease at: Ducketts Field, Mark Moor, Mark, Somerset. (Parish: Mark.) (Cattle.) SOMERST.

October 2nd, 1961. R. H. Smith, Mottistone Manor Farm, Newport, Isle of Wight (Parish: Carisbrooke.) (Cattle.) ISLE OF WIGHT.

October 2nd, 1961. D. S. Ham, Elm Tree Farm, Upper Weare, Axbridge, Somerset (Parish: Weare). (Cattle.) SOMERSET.

October 2nd, 1961. W. McLanachaw, Logan Hill Farm, Cumnock, Ayr (Parish: Old Cumnock.) (Cattle.) AYRSHIRE.

Fowl Pest

September 26th, 1961. J. F. Bostock, Barn Bank, Hyde Lea, Stafford. Disease at: Bank House Farm, Hyde Lea, Stafford. STAFFORDSHIRE.

September 26th, 1961. Mrs. V. E. Peacock, 16, Qua Farm, Soham, Ely, Cambs. CAMBRIDGESHIRE.

September 28th, 1961. H. Wade & Sons Ltd., Rosemount, Silfield, Wymondham, Norfolk. NORFOLK.

September 29th, 1961. Goode Bros., West Park Farm, Ickburgh, Mundford, Thetford, Norfolk. NORFOLK.

September 30th, 1961. F. W. Clarke, Willow Cottage, Silford, Wymondham, Norfolk. NORFOLK.

September 30th, 1961. J. G. H. Simper, Parley Beams, Earls Colne, Essex. ESSEX.

September 30th, 1961. G. R. Willsher, The Knowle, Denton, Canterbury, Kent. KENT.

September 30th, 1961. R. Pooleman, Prospect House, Hutton-le-Hole, York. YORK, NORTH RIDING.

October 1st, 1961. P. Cammidge, 143, Essex Way, South Benfleet, Essex. Disease at: 333, Benfleet Road, South Benfleet, Essex. ESSEX.

October 1st, 1961. J. & R. Finzel, Clavering Court, Clavering, Saffron Waldon, Essex. Disease at: Court Farm, Clavering, Saffron Waldon, Essex. ESSEX.

October 2nd, 1961. W. J. Baker, Nostra Domus, Furze Close, Thurston, Bury St. Edmunds, Suffolk. WEST SUFFOLK.

October 2nd, 1961. S. T. White, Holland Bungalow, Moor Lane, Staines, Middlesex. MIDDLESEX.

Swine Fever

September 26th, 1961. Trevor Davies, Creigiau Farm, Creigiau, Cardiff, Glam. GLAMORGAN.

September 26th, 1961. J. W. Rosbottom, Elms Farm, Whitefield, Manchester, Lancs. LANCASHIRE.

September 26th, 1961. E. J. Rees, Bryngwyn Farm, Kingsbridge, Gorseinon, Swansea, Glam. GLAMORGAN.

September 26th, 1961. P. Watts, Tintagel, Brynfield Road, Langland, Swansea, Glam. Disease at: Brynglais Farm, Ynysmeudwy, Pontardawe, Glam. GLAMORGAN.

September 26th, 1961. P. G. McLaren, Manor House, Thorpe Thewles, Stockton-on-Tees, Co. Durham. COUNTY DURHAM.

September 27th, 1961. H. Toon, Meadow Farm, Stone, Staffs. STAFFORDSHIRE.

September 27th, 1961. E. Kelsall, Bannfield, Mytton Oak Road, Shrewsbury, Salop. SHROPSHIRE.

September 28th, 1961. J. A. Allen, Betton Hall, Betton, Market Drayton, Salop. SHROPSHIRE.

September 29th, 1961. A. Jones, Brombal Farm, Margam, Port Talbot, Glam. GLAMORGAN.

September 29th, 1961. C. Brooks, Old Hill, Hall Lane, Drayton, Norwich, Norfolk NOR 52X. NORFOLK.

September 29th, 1961. N. V. Parry, The Villa, Willcott, Nesscliff, Shrewsbury, Salop. SALOP.

October 2nd, 1961. D. Jagger, Springfield Farm, Hightown, Liversedge, Yorks. YORK, WEST RIDING.

October 2nd, 1961. R. C. Brown & Son, Moseley's Farm, Fornham All Saints, Bury St. Edmunds, Suffolk. WEST SUFFOLK.

October 2nd, 1961. P. G. Daniels, Green Farm, Little Barningham, Norwich, Norfolk, NOR 19Y. NORFOLK.

October 2nd, 1961. J. B. Thomas & Sons, 67, Pentrechwyth Road, Swansea, Glam. COUNTY BOROUGH OF SWANSEA.

October 2nd, 1961. R. H. Leonard, Westhill, Aldbrough, Hull, Yorks. YORK, EAST RIDING.

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

Bovine Contagious Pleuropneumonia

Sir,—Referring to the letter of Mr. R. M. Watts published in your issue of April 22nd, 1961, it is a basic truth of disease control that any control programme must be adapted to all the circumstances under which the disease occurs on the ground. It is hardly surprising, therefore, that divergency in outlook should exist between authorities responsible for the control of bovine pleuropneumonia in East Africa and in Australia, when the problems posed by the disease in the two countries are so widely different.

Here in Kenya, pleuropneumonia is enzootic over wide areas of Masailand, and the situation has recently become more serious than ever because of widespread uncontrolled movement of cattle following the virtual failure of seasonal rains. Despite our efforts over the last few months with field testing units, we are still uncertain even as to the total magnitude of the problem, but it is estimated that out of a cattle population of approaching 1,000,000, perhaps a quarter are in infected herds. Many such herds are in the recovery stage but many are actively infected, and not all infected herds are in supervised quarantines.

The objects of such field testing as has so far been carried out have been largely experimental—to determine the effectiveness of large-scale field testing in the various aspects of control. Sufficient progress has been made to show that the test is very valuable for certain purposes, while for others its effectiveness has not yet been investigated.

The field test is being used for the purpose of clearing up old standing quarantines. This may not appear at first sight to be a very positive step towards overall disease control, but in the Kenya context it is very important. Scarcity of food and water in the comparatively few areas suitable as quarantines greatly hampers control, so much so that in recent months many known infected herds have not been sent into quarantine because there has been no room for them. The removal of infected herds to supervised quarantines must remain the essential first step in future control, and it is hence a most urgent matter to remove as many herds as possible from quarantine areas in order to make room for freshly infected herds.

In attempting to clear quarantines by field testing, we have now found on a number of occasions that even in herds removed by several years from an active outbreak, and with no history of intervening clinical disease, infected animals are regularly detectable; and that following the removal of such animals subsequent tests often show the presence of reducing numbers of low titre reactors, apparently indicating the persistence of some degree of active infection. Calves are sometimes implicated. Clearing of quarantines will apparently need repeated tests, and although we have not yet had time to clear any quarantine completely, the indications are that field testing will enable most quarantines' herds to be released after 2 to 3 years instead of a minimum of about 5 years as at present. This represents a considerable gain over existing practice.

The third of the possible applications of field testing, as expressed in my original letter, was the eradication of the disease in the clinically infected herd, with the proviso that eradication was envisaged only in the early stage of an outbreak. It should be emphasised that we have never considered that testing with removal of reactors would make the slightest impression in an active outbreak which had reached a certain degree of momentum. No serological test can hope to detect incubating animals before antibody production has reached a critical diagnostic level, and where, in an acute outbreak, a high proportion of incubating animals are to be expected at any one time, we have always thought that the only solution is to isolate the herd and let the disease run its course, subject to whatever benefit can be derived from vaccination. (Slaughter of a herd is not practicable here.) In the case of the herd in the early stage of infection, however, the position is different and there may be at least a possibility that eradication might be achieved by repeated short-interval testing with removal of reactors. Considerable reliance is placed on the demonstration by Campbell and Turner that antibody is usually detectable at the same time as, or slightly before, the appearance of clinical symptoms. If this be true, then repeated testing at sufficiently short intervals should be able to indicate for removal most if not all infected animals before these become clinical. If the further assumption be made that clinical animals are the chief vectors of the disease, it seems reasonable to suppose that such a programme would halt the impetus of disease within the herd. Whether or not short interval testing with removal of reactors can eradicate disease from the recently infected herd can be determined only by experiment, and unfortunately the opportunity of carrying out such an experiment has not yet arisen.

A further possible application of field testing has recently been under consideration here. There are grounds for believing that vaccination with any living vaccine introduces a risk of producing the clinical disease, with typical pulmonary lesions, in vaccinated animals. (It is of interest that in the course of survey testing we have encountered several cases of pulmonary disease, all showing encapsulated lesions apparently of long standing, and all under circumstances indicating the probability that such lesions had been acquired as a result of vaccination with egg-adapted vaccine between 2 and 3 years previously.) The production of typical pulmonary disease, presumably transmissible, in a small proportion of vaccinated animals is a matter of little moment when vaccination is confined to infected

herds, but is a much more serious thing when large-scale vaccination of healthy cattle is contemplated. The risks could be reduced if, following the vaccination of a disease-free population, all animals were to be tested 6 months later, any test reactors then being removed. We hope to carry out a large-scale trial along these lines in the near future.

I should make it clear that the adoption of large-scale field testing as an adjunct to control of pleuropneumonia was never intended as a substitute for vaccination. Our policy for many years has been to make the maximum possible use of vaccine in infected herds, with the object of raising immunity and shortening the period of quarantine, and this policy remains unchanged.

Finally, Mr. Wells indicates two main disadvantages which he considers to attach to the use of the field test equally with the laboratory test. The first is the inability of the complement fixation test to detect the incubating animal, but this does not necessarily imply that the test, used repeatedly at short intervals, might not be able to achieve eradication in cases where the incidence of infection is low. This is a matter for experiment, which we intend to carry out at the earliest opportunity. The second disadvantage mentioned by Mr. Watts, the facilitation of additional spread of infection when cattle are congregated in a confined space for testing, calls for the rueful comment that congregation in a confined space is a regular nightly feature of cattle management in Masailand!

Yours faithfully,
J. E. HUDDART.

Ministry of Agriculture, Animal Husbandry and Water Resources,
Department of Veterinary Services,
Veterinary Research Laboratory,
P.O. Kabete,
Kenya.
September 22nd, 1961.

The Behaviour of Cattle in Crushes

Sir,—Mr. Ewbank's article on the behaviour of cattle in crushes and the ensuing views have been most interesting. In this part of the country the mass produced transportable steel crush predominates. These are usually manufactured by agricultural engineering or dairy equipment firms. Owing, perhaps, to the fractious nature of East Anglian cattle, it is necessary for the tractor to remain attached to the crush when in use in order to maintain stability. Even so, it has been known for a delinquent Red Poll or an enraged Angus to shift both crush and light tractor a couple of feet. It is usually found that while tuberculin testing, the operator finds it easier to work on the right-hand side of the animal, both for clipping the neck and reading the ear number. The manufacturers, however, invariably construct the crush with the tractor attachments on the right side. Thus the unfortunate veterinary surgeon, being right handed, undergoes contortions to clip, measure and inject on the left, then has to lean hazardously across the animal's head to read the ear marking in the right ear.

Another drawback of this type of crush is the poor, or often non-existent, adjustment for the width of the yoke. An adult animal may be secured quite well, but the yoke allows a 2-year-old to get its front legs and shoulders through and hang suspended by its abdomen, whilst a yearling will scramble straight through.

There is no doubt that the temperament of cattle in crushes may be "attenuated by passage," but it is only in recent years that humans in remoter parts have come to use crushes, however imperfect, to restrain cattle. One still arrives at a farm to start a tuberculin test to find the tractor-man just leaving to borrow the neighbour's crush, whilst aged farm hands debate whether it is worth using one of these "new-fangled things" or not. Our clients, at last, are becoming "crush conscious," and, perhaps with continued perseverance and suitable breeding, a "crush docility" gene will appear in our cattle and we can expect to get our 60 heifers through in 38 minutes on the first occasion and in even less time on subsequent days.

Yours faithfully,
M. P. KEARNS.

Alt-na-Granda,
Waveney Road,
Beccles,
Suffolk.
September 26th, 1961.

Humaneness of Cyanide

Sir,—I am amazed that Mr. L. Pitcher's letter of September 20th should have been accepted for publication.

Surely Mr. Pitcher must have heard of a barbiturate drug called pentobarbitone? This is quite cheap and, if he finds the technique of intravenous injection beyond him, perhaps he could manage an intraperitoneal injection of it.

By the publication of Mr. Pitcher's preference for chloroform and liq. strych. THE VETERINARY RECORD is in danger of lowering the standard of our profession to that of an inhumane one in the eyes of lay people who may chance to read its journal.

Yours faithfully,
D. A. L. POULTER.

78, Nelson Road,
Whitton,
Twickenham,
Middlesex.
September 30th, 1961.

Sir,—We were shocked to read in your issue of September 30th, 1961, that Mr. L. Pitcher of High Wycombe still destroys dogs with liquor strychnine, despite the fact that the use of this poison was deprecated in the Report of the Special Committee of the National Veterinary Medical Association on Small Animal Euthanasia as long ago as 1937. "The experiences which members of the Committee have had of strychnine poisoning in the dog after both accidental and malicious administration have firmly convinced them of its painful and distressful character."

Strychnine stimulates sensory as well as motor parts of the central nervous system and there can be little doubt that the convulsions associated with strychnine poisoning are excruciatingly painful. We can only hope that Mr. Pitcher is the only member of our profession to persist in using this method of destruction.

Yours faithfully,
F. ALEXANDER,
Reader, Veterinary Pharmacology.
GEO. F. BODDIE,
Professor, Veterinary Medicine.
A. R. WITHERS,
Senior Lecturer in charge of Small Animal Clinic.
University of Edinburgh,
Royal (Dick) School of Veterinary Studies,
Summerhall,
Edinburgh, 9.
October 2nd, 1961.

Sir,—In spite of Major Hancock's views on prussic acid and Mr. Pitcher's preference for strychnine, there must be many members of our profession who have grave misgivings about the use of these drugs for the destruction of dogs.

Anyone comparing the effect of either drug with that of a solution (3 gr. in 1 ml.) of pentobarbitone sodium administered either intravenously or intracardially can have few doubts as to which is the kinder.

Yours faithfully,
PETER WILSON.

272, Marlborough Road,
Swindon,
Wiltshire.
October 1st, 1961.

Caesarean Section and Enterectomy in a Beef Heifer

Sir,—At 9 p.m. on August 26th, 1961, we were called to examine an 18-month-old Hereford heifer which had been mistakenly served as a yearling. The heifer had been straining for a few hours without progress.

Examination revealed a live, relatively oversized calf which could not be engaged in the pelvis. The heifer was in good condition and it was agreed to perform a caesarean section.

Five ml. Largactil* in 5 ml. of water (½ mg. per lb. bodyweight) were given intravenously and the heifer was cast, hobbled and restrained on its back with one hind leg pulled back allowing access to the mid-line. Local infiltration of the mid-line using 2 per cent. Procaine Hcl* allowed normal mid-line entry into the abdominal cavity, but severe straining occurred with prolapse of the viscera necessitating more general anaesthesia using approximately 18 ml. of Euthatal intravenously.*

A live calf was delivered, and aureomycin oblets† were placed in the uterus before closure.

The mid-line was repaired in 2 layers, the linea alba and peritoneum by single interrupted sutures and the skin by mattress type, using No. 30 lb. braided nylon. Anaesthesia was lightened by 2.86 g. megimide intravenously.‡

On August 27th, 1961, at 11 a.m., the heifer was up and eating; the wound appeared to be satisfactory and the calf was suckling. The heifer had cleansed. At 8 p.m. the farmer reported that the heifer was down with a portion of gut showing at the operation site. Examination showed the heifer to be acutely shocked, and a portion of intestine was extruding through the skin wound; the mesentery was torn and the gut cold and grossly contaminated. Intravenous Euthatal (approximately 20 ml.) was introduced without premedication and the heifer restrained as before. The skin wound was re-opened. The linea alba sutures were intact but inadequate; the suturing by one of us (W. B. F.) had been too widely spaced at one point and intestine had herniated. Enterectomy was performed removing approximately 6 feet of intestine, an end-to-end anastomosis effected, and the mesentery repaired. Frank contamination was removed and the portion of intestine returned; four aureomycin oblets were placed in the abdominal cavity and the wall closed with further interrupted braided nylon sutures. 2.86 g. megimide and 2 × 400 ml. glucose saline were given intravenously. Antibiotic coverage was provided for 5 days using 10 ml. Streptopen intramuscularly§ and the beast made a rapid and complete recovery. The skin sutures were removed on September 7th, 1961.

The reward from this case is clearly not financial, and the impressive recovery must be related to the good condition of the beast and the early interferences we were asked to make.

Our experience emphasises the need for epidural anaesthesia and adequate suturing if this mid-line approach is used.

Yours faithfully,
W. B. FAULL.

81a, Wantage Road,
Wallingford,
Berks.

J. BREWITT,
Final year student.

Royal Veterinary College,
London.
October 2nd, 1961.

* May & Baker Ltd.
† Cyanamid.
‡ C. J. Hewlett & Sons Ltd.
§ Glaxo.

A New Method for the Administration of Trypanocidal Drugs to Animals

Sir,—The purpose of the present communication is to draw attention to a new method of injecting irritant drugs which are used in the prophylaxis of trypanosomiasis in cattle. The work described was begun at the East African Trypanosomiasis Research Organisation, Tororo, and continued by one of us (M. J. H. C.) at the Animal Health Research Centre, Entebbe.

In recent years a number of new trypanocides or trypanocidal complexes of the phenanthridine series have been produced. One of the main disadvantages

of these new phenanthridines and their complexes has been the excessive tissue reaction at the site of injection resulting in large swellings, sometimes accompanied by rupture (Robson & Cawdery, 1958; Stephens, 1958; Smith, 1959; Smith & Brown, 1960). In the case of homidium suraminate, several unsuccessful attempts have been made to reduce the local reaction (Stephens & Williamson, 1958). This complex, although otherwise a promising prophylactic, causes too severe a local reaction to be of practical application.

In an attempt to improve the local tolerance it was decided to suspend the homidium suraminate in a high viscosity oily base and to inject this by means of a lever-action grease gun (Fig. 1) which had been modified to take a Luer-lock nozzle and hypodermic needle.

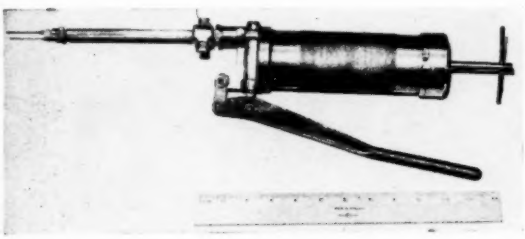


FIG. 1.—The modified grease gun.

A suspension of homidium suraminate (13 per cent.) concentration of the homidium cation in anhydrous lanolin, olive oil and water in the ratio of 8:1:1) was injected subcutaneously into the dewlaps of 2 bullocks. The dosage rate was 5 mg. of the homidium cation per kg. bodyweight. As regards size the lumps were considered acceptable but at the 10th week the site ruptured. Further trials with this complex showed that though this method of injection reduced the size of the reaction site, it was not able to prevent rupture of the depot of this very irritant drug.

Prothidium bromide* was then tried as a 10 per cent. suspension in a mixture of anhydrous lanoline (80 per cent.) and olive oil (10 per cent.). Originally, 2 bullocks were treated with this suspension, one animal at 1.5 mg. and the other at 3.0 mg. of Prothidium bromide per kg. bodyweight. The reaction sites were considered acceptable. Both animals were challenged by the injection of a recently isolated strain of *Trypanosoma congolense* 2 months post-treatment. As they were both aparasitaemic 3½ months later, they were rechallenged with the same strain of *T. congolense* and are still aparasitaemic 10 weeks later.

The reaction site after injection of Prothidium in this form was similar, initially, to Prothidium in an aqueous solution, but unlike the aqueous solution it quickly reduced, so that between 10 and 13 days after injection it was markedly smaller. At this time the reaction was a hard, apparently painless, spherical swelling up to 7 cm. in diameter following a dose based on 4 mg. per kg. Lower dosage rates gave smaller but otherwise similar reactions. In comparison the reaction to Prothidium injected as an aqueous solution at this dosage rate (4 mg. per kg.) showed a hard plaque-like or cord-like swelling which was 15 to 20 cm. long by 7 to 15 cm. deep by 7 cm. wide.

Six animals were treated subcutaneously in the dewlap with metamidium† chloride hydrochloride as a 14.7 per cent. concentration in a mixture of lanolin (80 per cent.) and olive oil (5 per cent.), the dosage rate being 4 mg. per kg. bodyweight. They were exposed to a natural infection transmitted by *Glossina morsitans* (Apparent Density‡ 40; infection rate 12 per cent.) in Ankole, in south west Uganda. To date, 20 weeks post-treatment, they are still aparasitaemic. The reaction sites, however, are not acceptable owing to the tendency to rupture. Two other uninfected animals, which were treated with the same suspension in the dewlap at a dosage rate of 2½ mg. of metamidium per kg. bodyweight, are entirely satisfactory.

It is felt that there are certain advantages of this method particularly in relation to mass prophylactic treatment. The first is that the percentage of drug in the suspension can be increased considerably over normal solutions or water suspensions, thus reducing the volume of the injection (*e.g.* Prothidium is normally used as a 2 per cent. or 2.5 per cent. solution in water as compared to the 10 per cent. suspension in lanolin). Secondly, a large number of doses can be contained in the reservoir, which reduces the time spent in filling syringes. The present gun can contain 40 to 50 doses, and delivers approximately 1 g. of the material at each stroke. The error of delivery is less than 5 per cent.

As yet there is little known about the absorption of the drug from this form of base. Adequate prophylaxis has been obtained in mice injected with Prothidium bromide in oil (Woolfe, 1961), so there is a possibility that prophylaxis will be obtained. The present method appears to show promise in partially reducing the local reaction, though it is unable to stop the rupture of the depot of drugs where this is a common characteristic, *e.g.* homidium suraminate. It is considered that some local reaction is unavoidable, but providing that this hinders the animal only temporarily, or not at all, it is not of any great importance.

In the case of some phenanthridines it is recommended by the makers that they be given intramuscularly. It is our opinion that for prophylactic treatment this route is contra-indicated owing to muscular damage, particularly in the case of treatment at regular intervals such as occurs in prophylactic treatment. If the method described above allows the subcutaneous use of these drugs a considerable advance will have been made.

Further work is being undertaken on these lines

* Boots Pure Drug Co. Ltd.

† May & Baker Ltd.

‡ The Apparent Density of tsetse is the number of non-teneral male flies caught per 10,000 yards of fly round.

with other drugs and bases, both in respect of local tolerance and anti-trypanosomal activity.

We wish to thank Mr. P. R. Pietersen for modifying the grease gun.

Yours faithfully,
M. J. HOPE CAWDERY.

Animal Health Research Centre,
P.O. Box 24,
Entebbe,
Uganda.

R. H. KNIGHT.

East African Trypanosomiasis Research Organisation,
P.O. Box 96,
Tororo,
Uganda.

September 22nd, 1961.

References

ROBSON, J., & CAWDERY, M. J. H. (1958). *Vet. Rec.* **70**. 870.
SMITH, I. M. (1959). *J. comp. Path.* **69**. 105.
———, & BROWN, K. N. (1960). *Ibid.* **70**. 161.
STEPHENS, L. E. (1958). *Ann. trop. Med. Parasit.* **52**. 417.
———, & WILLIAMSON, J. (1958). *Ibid.* **52**. 427.
WOOLFE, G. (1961). Personal communication.

Methohexital Sodium in Small-animal Anaesthesia

Sir,—The interesting comments from Messrs. Joss and Wright stimulate us to discuss the points they raise. Having now had the opportunity of administering methohexital sodium to some 300 dogs and cats without any untoward result, we believe that the advantages of this drug lie in its wide margin of safety, and rapid and complete recovery of the patient, the animal always being ready for discharge and normal in all respects, half an hour after administration. Joss and Wright say that they estimate the recovery rate "to be about the same as with thiopentone." We believe that a direct comparison between the two agents is difficult, since so much depends on the speed of administration. Recovery from thiopentone anaesthesia cannot be said to be regularly complete in 30 minutes, even if, for purposes of short-duration anaesthesia, the dosage rate is reduced (say to 1/10 grain per lb. bodyweight) and the dose administered rapidly. Indeed, although following such administration recovery may sometimes be surprisingly rapid, it may also sometimes be surprisingly prolonged, the animal not walking normally, *i.e.* with no wobble, even after several hours. With the anaesthetic dose of 1 grain per 5 lb. bodyweight "the average period of anaesthesia obtainable from the use of thiopentone sodium alone is about 20 minutes, and, although individual variation may occasionally be observed, full recovery is to be expected in 2 to 3 hours."* It is well established that complete recovery may be especially prolonged if additional doses are administered. With methohexital sodium, however, recovery is invariably rapid and complete within 30 minutes.

We should imagine that Messrs. Joss and Wright normally use a fairly rapid injection rate (say within 30 seconds) when inducing anaesthesia with an agent such as thiopentone. The "slow rate of administration" which we suggested would be associated with muscular tremor was for a period of induction of about a minute or more. Thus an administrator inexperienced in the use of methohexital sodium may get a very bad impression of the drug. Administration by our recommended method overcomes this.

It seems that the paddling movements to which Joss and Wright refer are a violent form of our "muscular tremor" which we find occurring with a slow rate of administration. If administration at a slower rate than the one we would recommend is adopted, then induction and recovery would also be slower and there is more time for such side-effects to develop. Thus the rate of administration used by Joss and Wright could well lie midway between our very rapid, and our so-called "slow" rate, of administration. During recovery these movements, which are stimulated and accentuated by noise, light and handling, are not of long duration, and are not harmful providing the animal is placed on an adequate flat surface where it cannot harm itself.

Finally, we should like to bring to the attention of your readers a short article on methohexital sodium anaesthesia in rats, by N. Bleicher, R. F. Sloan, J. Norfleet and F. L. Ashley, which appeared in the September, 1961, Proceedings of the Animal Care Panel.

Yours faithfully,
N. G. FOWLER,
D. E. STEVENSON.

The Ord,
34, New Dover Road,
Canterbury,
Kent.

October 2nd, 1961.

* "Anaesthetics in Veterinary Practice," p. 3, May & Baker.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-Mouth	Fowl Pest	Sheep Scab	Swine Fever
16th to 31st August, 1961		5	—	—	41	—	42
Corresponding period in	1960	8	—	—	12	—	55
	1959	8	—	—	11	—	47
	1958	2	1	1	51	—	33
1st January to 31st August, 1961		133	—	103	781	—	784
Corresponding period in	1960	150	—	14	1,389	—	796
	1959	148	—	9	477	—	779
	1958	106	4	114	477	—	898